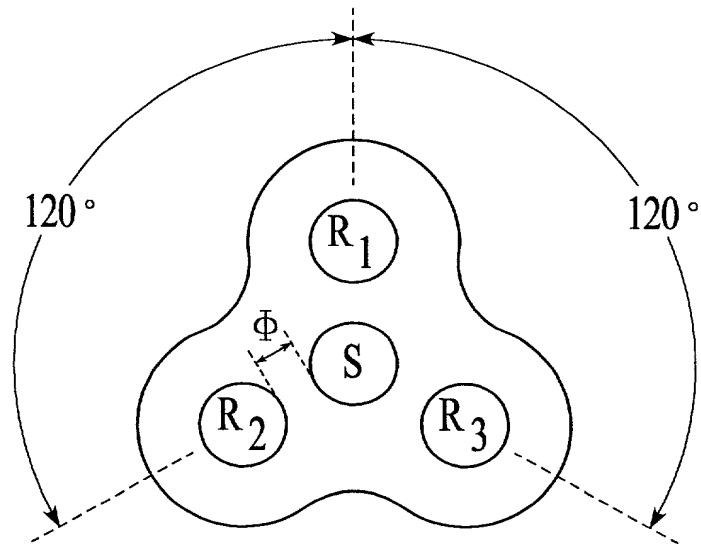


FIG. 1



R - LIGHT RECEIVER FIBER OPTICS
S - LIGHT SOURCE FIBER OPTIC

FIG. 2

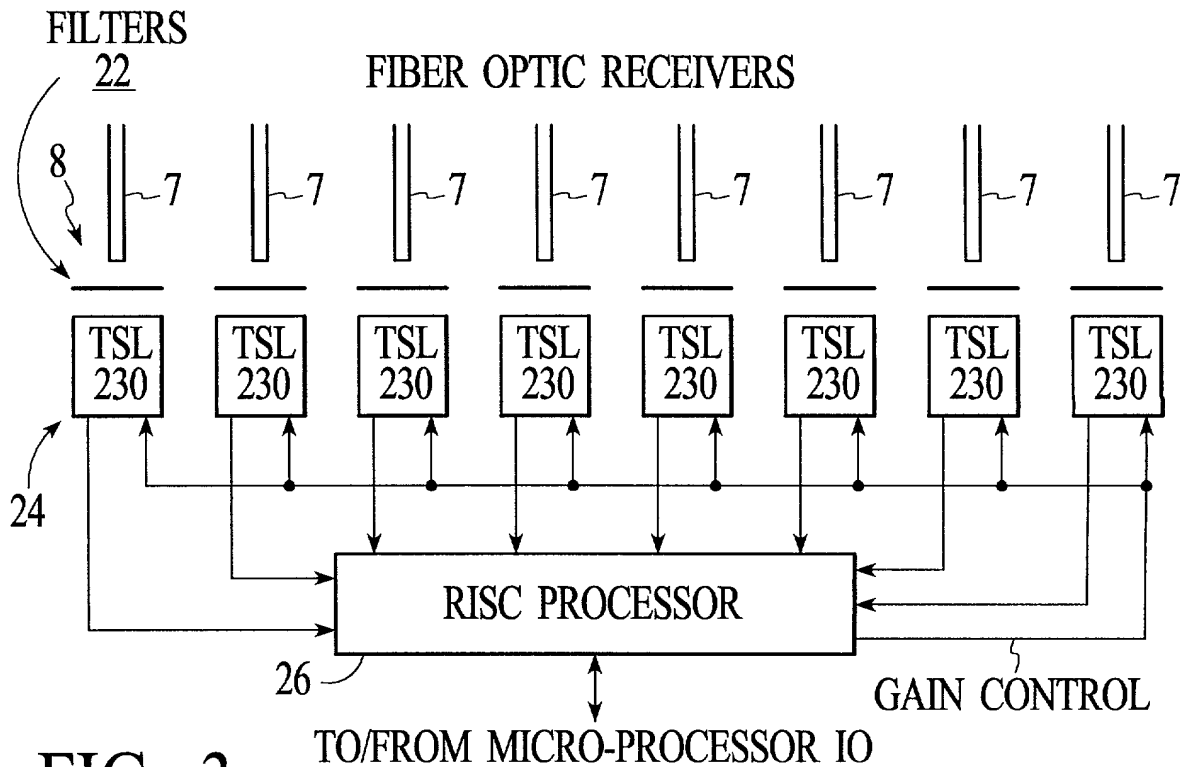


FIG. 3

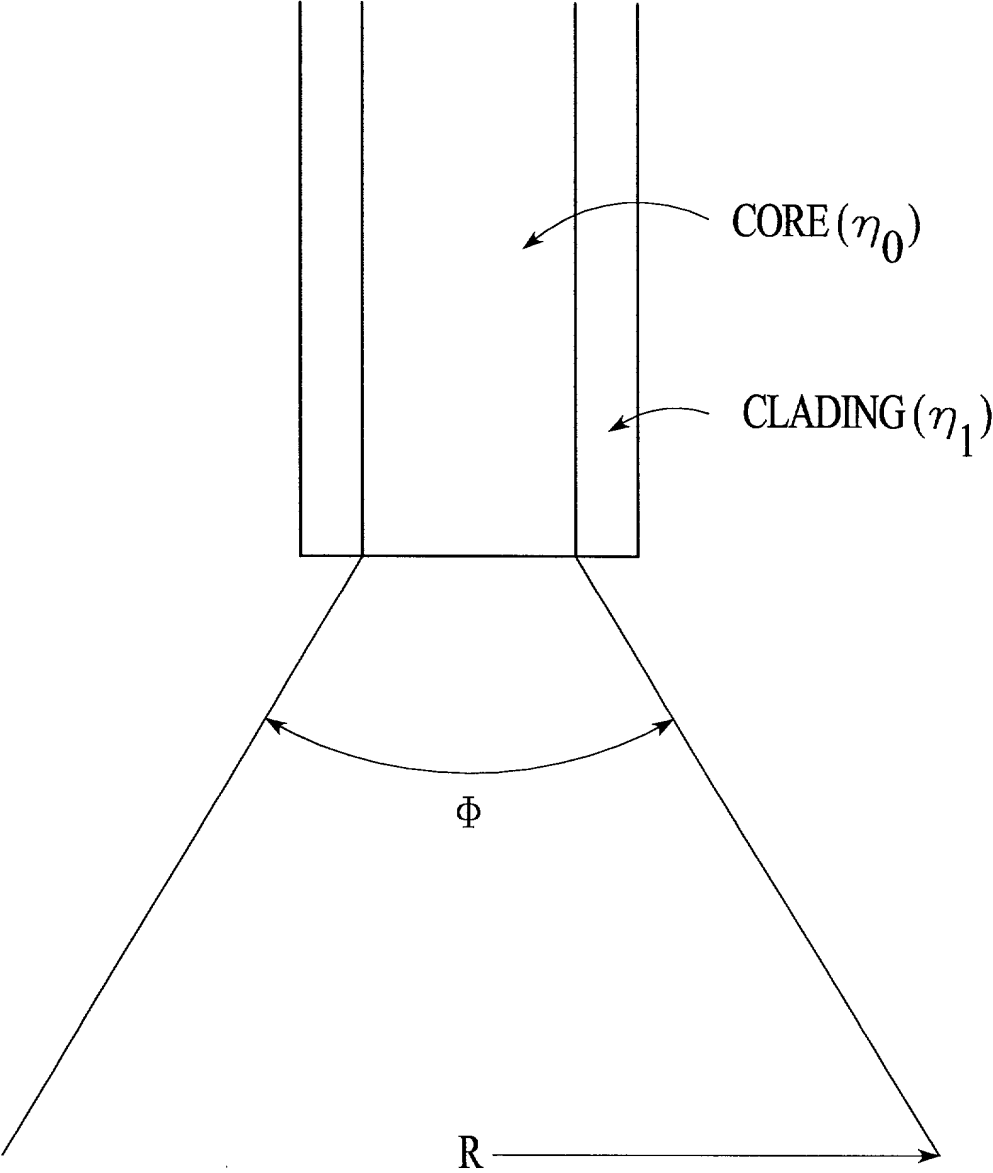


FIG. 4A

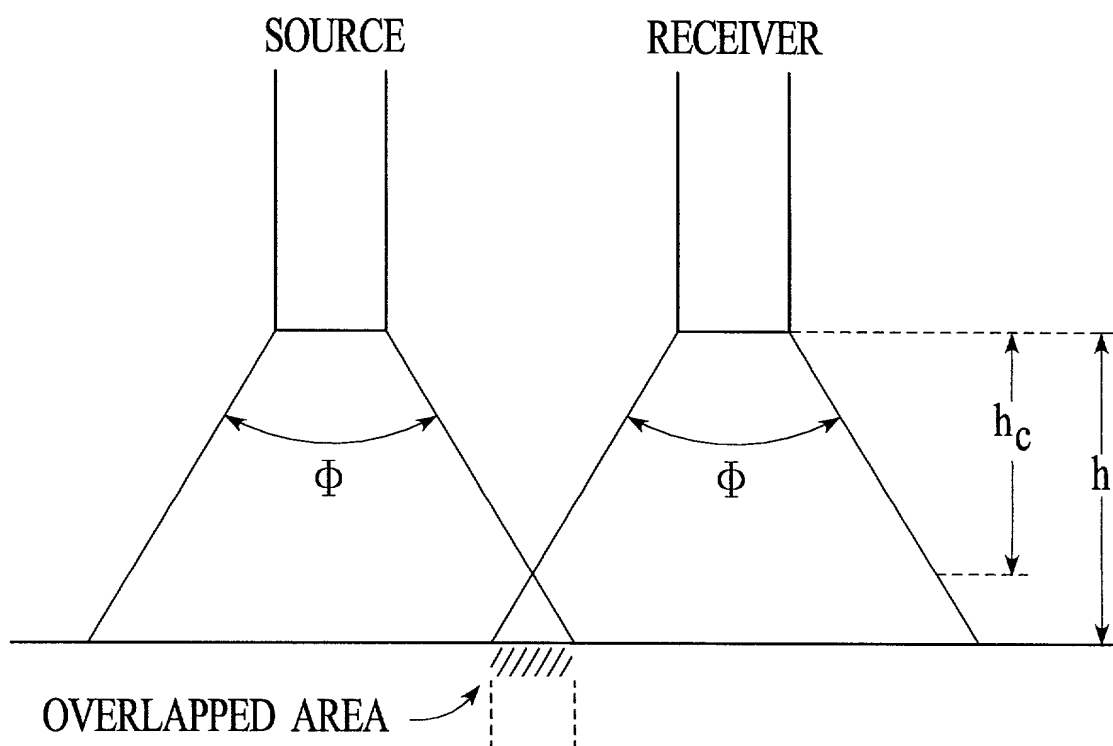


FIG. 4B

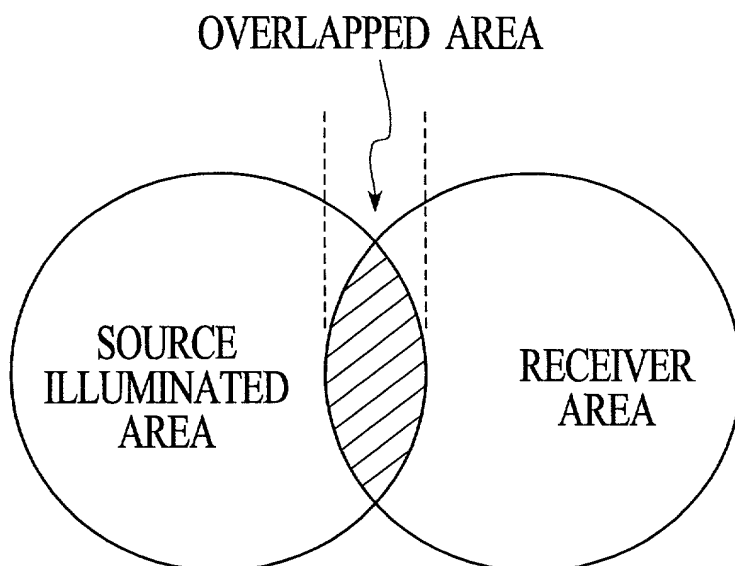


FIG. 4C

5/99

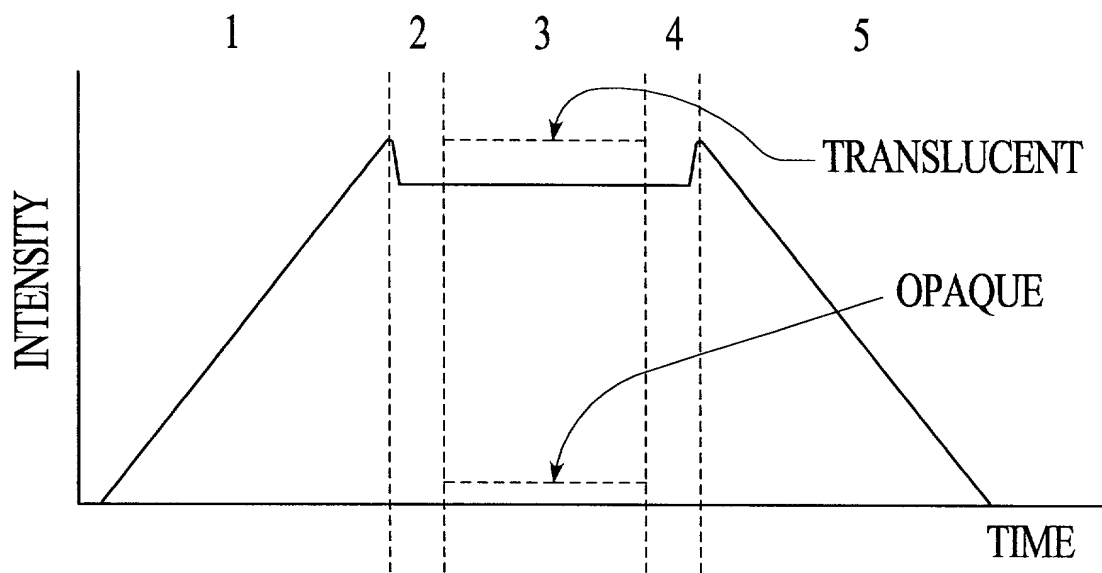


FIG. 5A

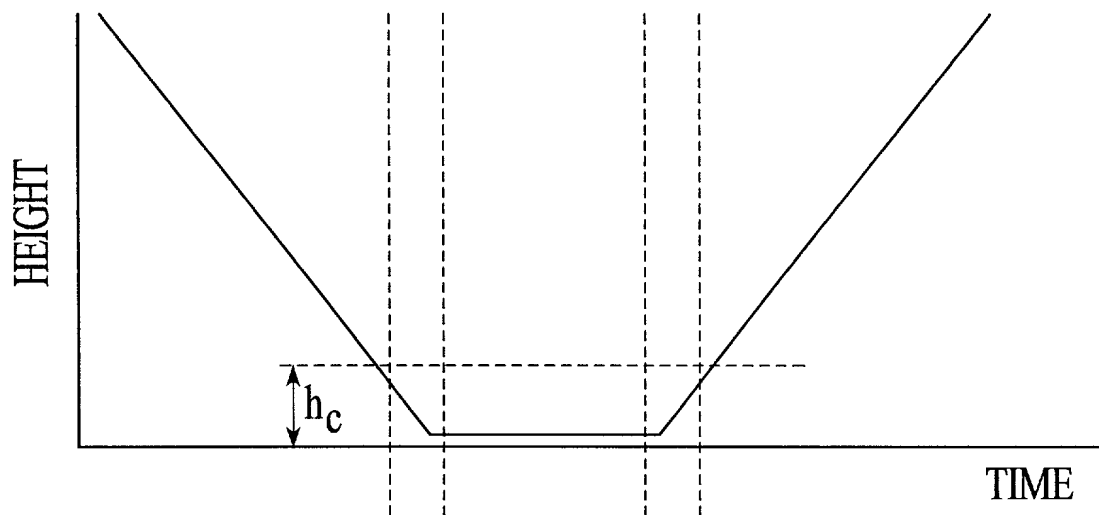
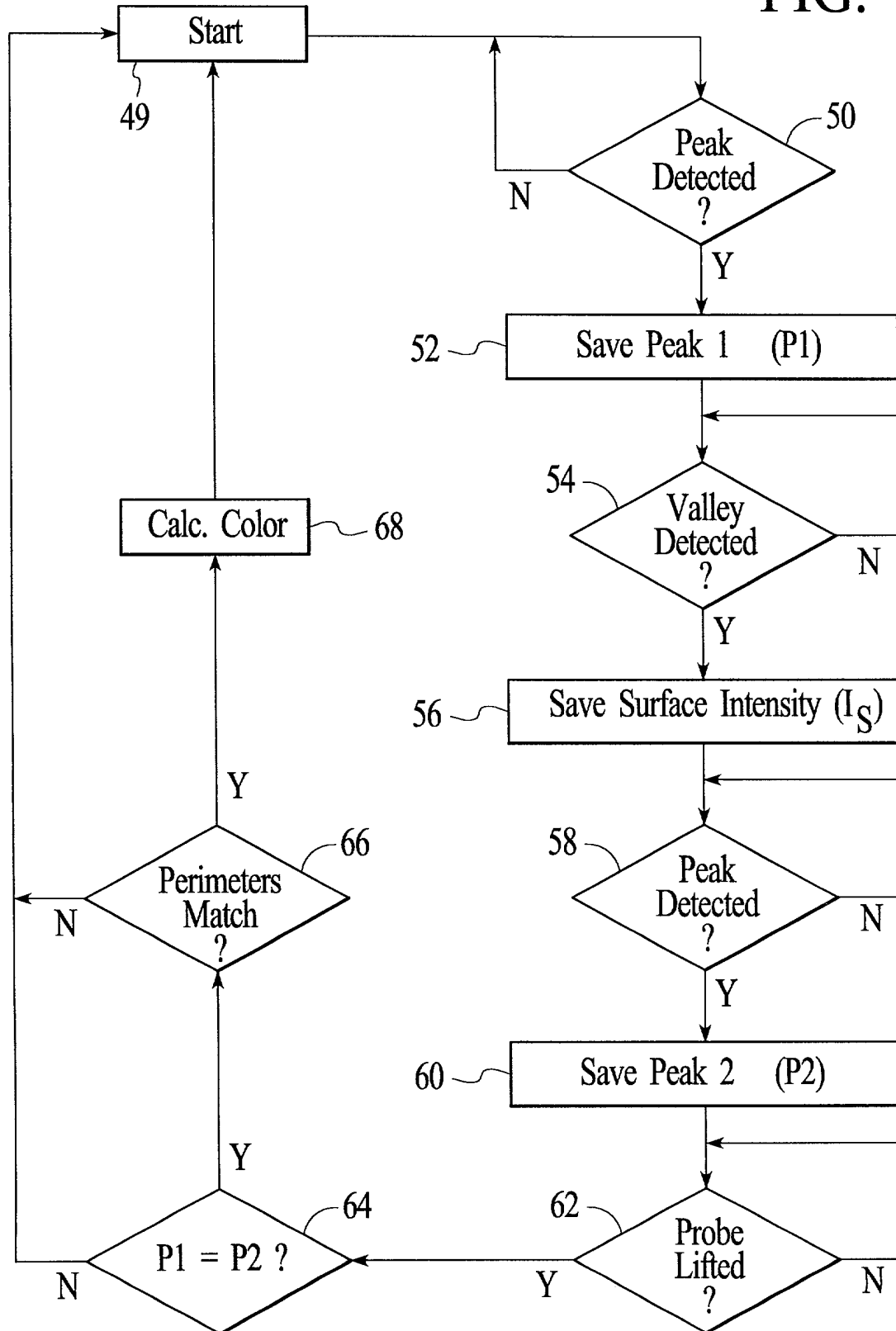


FIG. 5B

FIG. 6



7/99

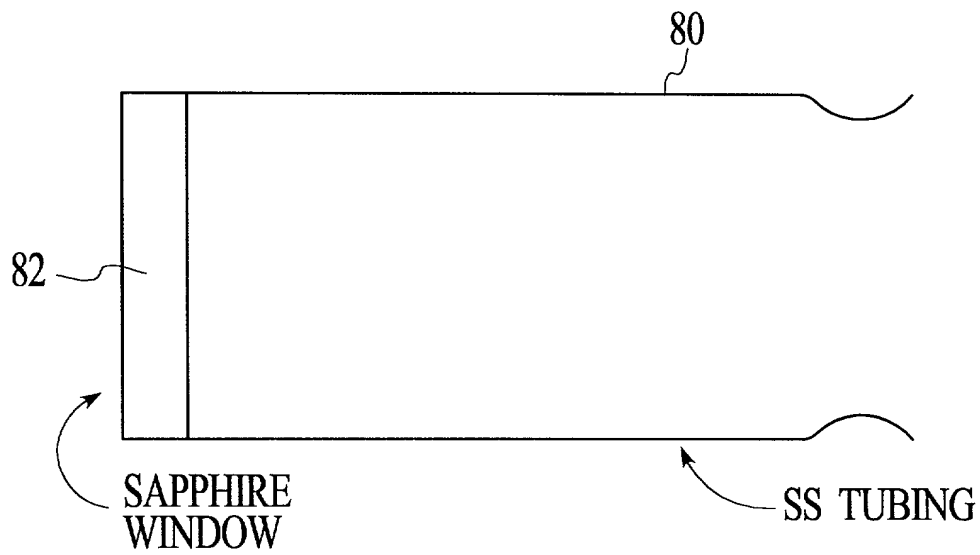


FIG. 7A

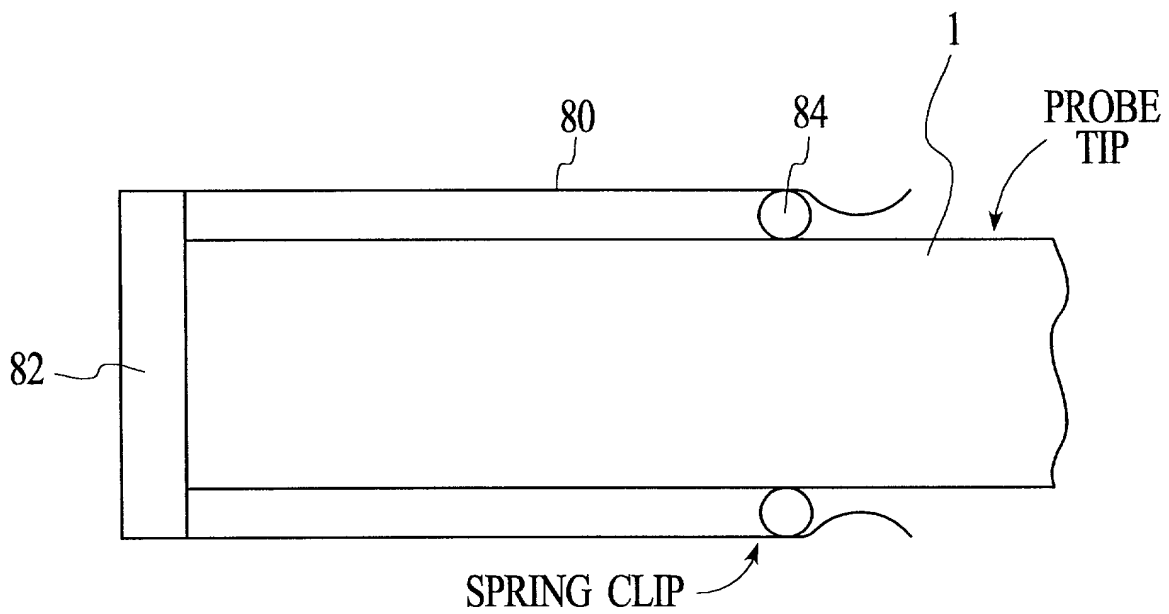
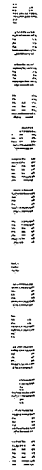
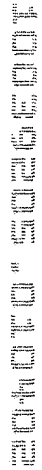
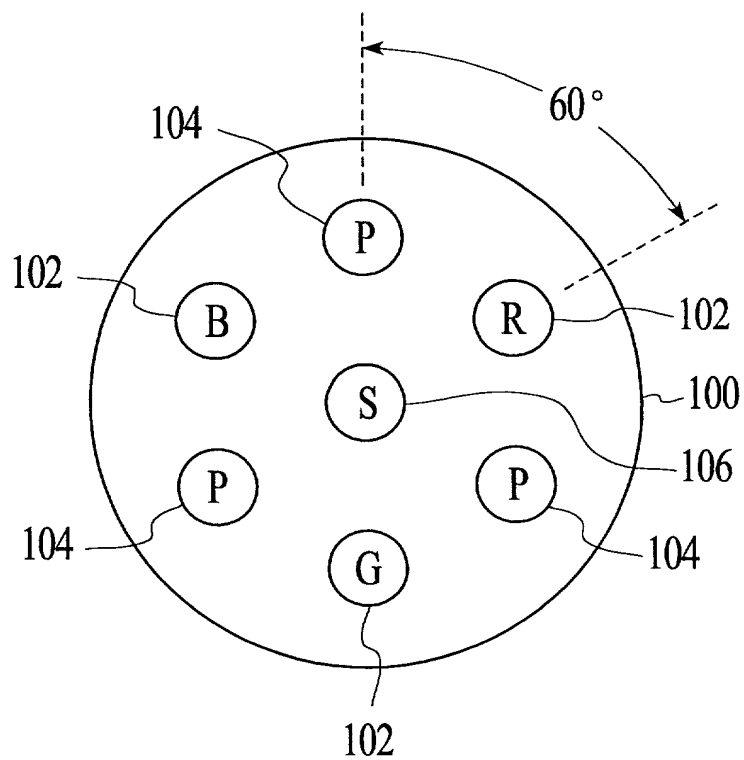


FIG. 7B

[illegible][illegible]



S - LIGHT SOURCE FIBER
R - RED RECEIVER
G - GREEN RECEIVER
B - BLUE RECEIVER
P - NEUTRAL (FULL BAND) RECEIVERS

FIG. 9

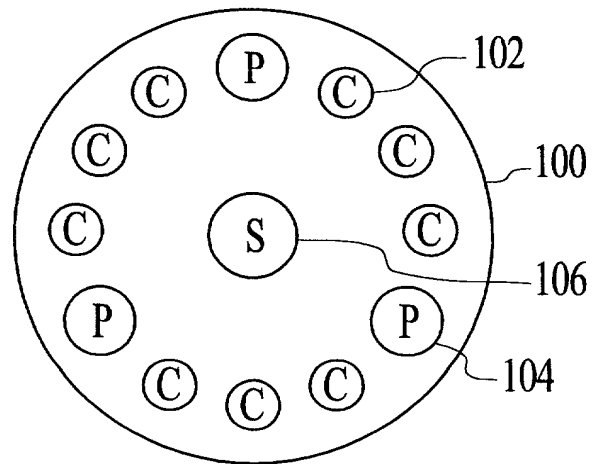


FIG. 10A

S - LIGHT SOURCE FIBER
 P - NEUTRAL (FULL BAND) RECEIVER
 C - COLOR RECEIVER

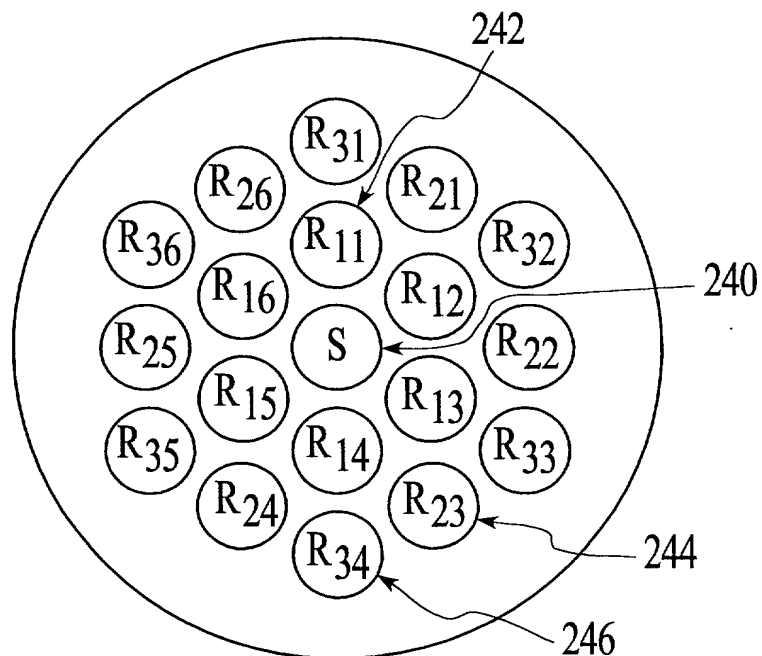
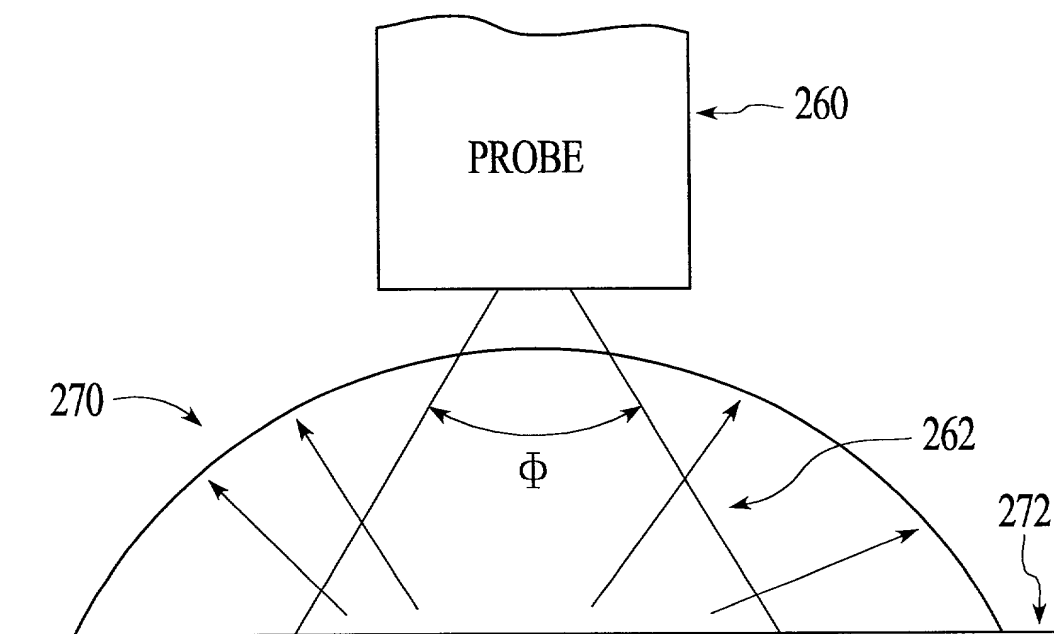
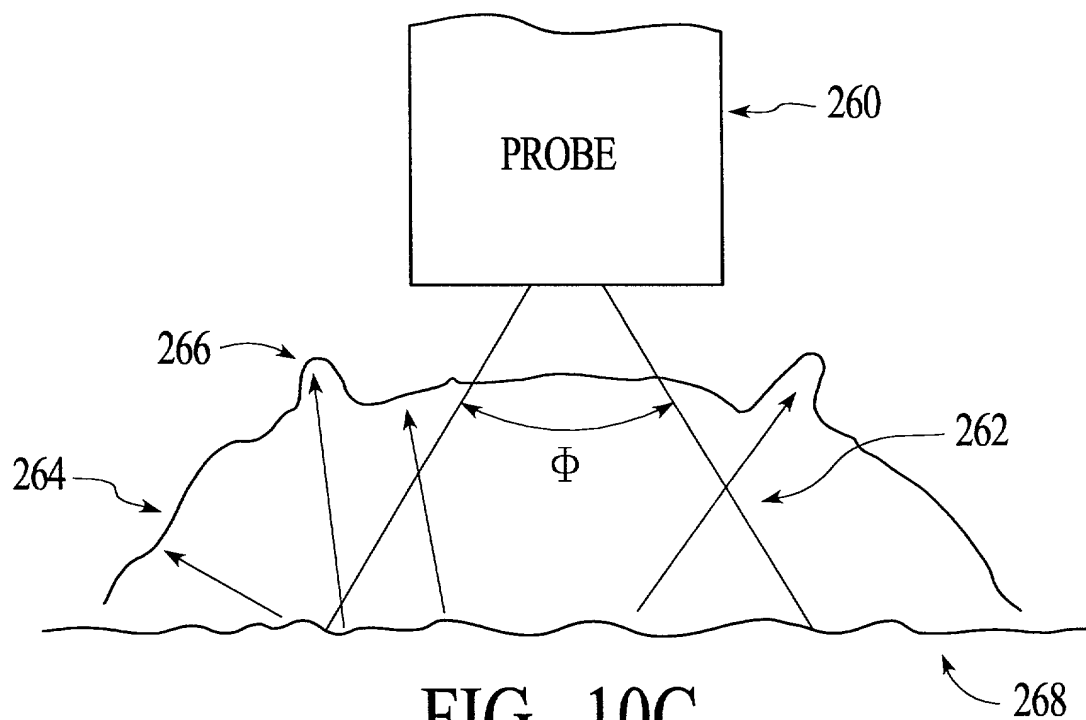


FIG. 10B

S - LIGHT SOURCE FIBER
 R_{1X} - INNER RING RECEIVER FIBER
 R_{2X} - 2nd RING RECEIVER FIBER
 R_{3X} - 3rd RING RECEIVER FIBER



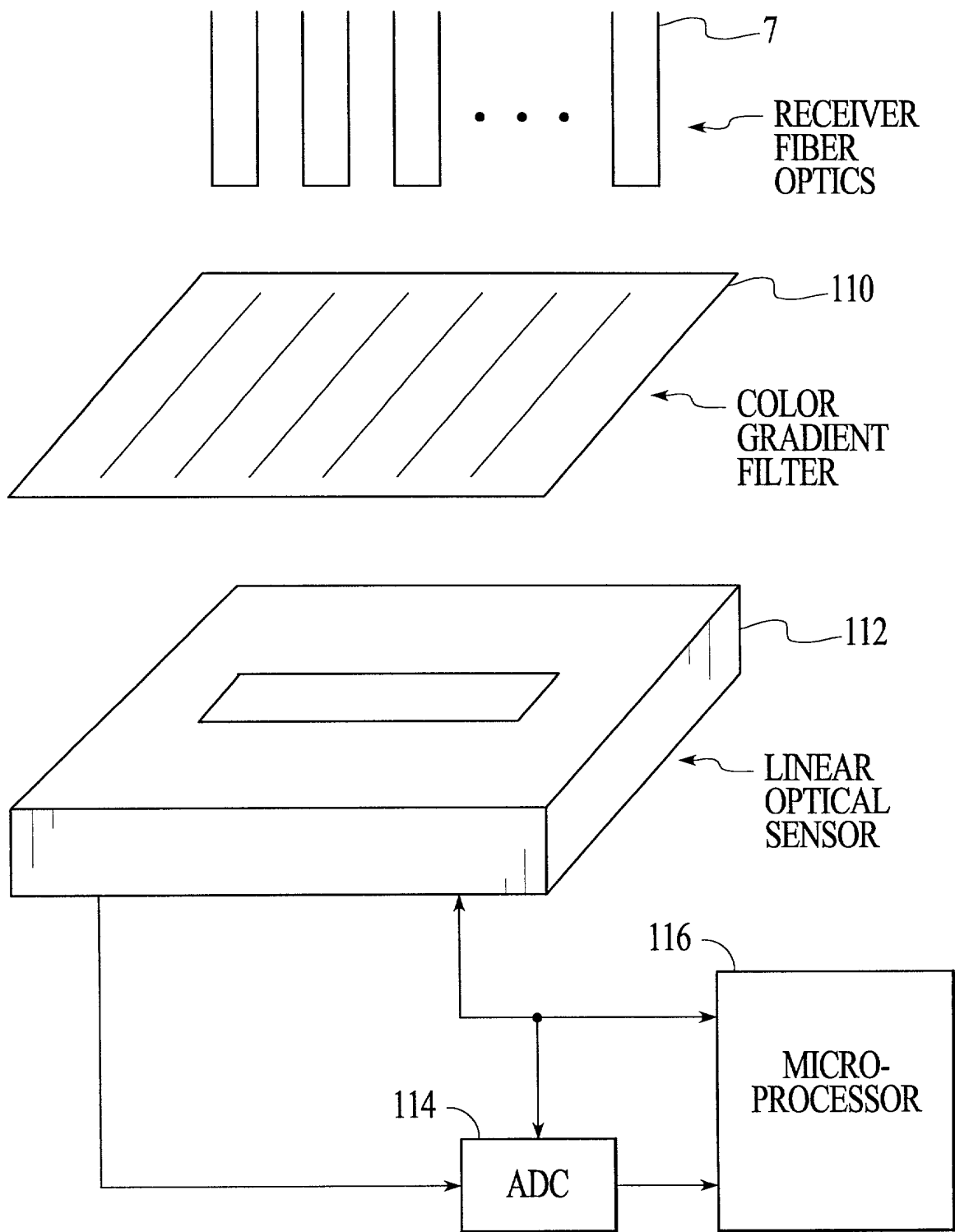


FIG. 11

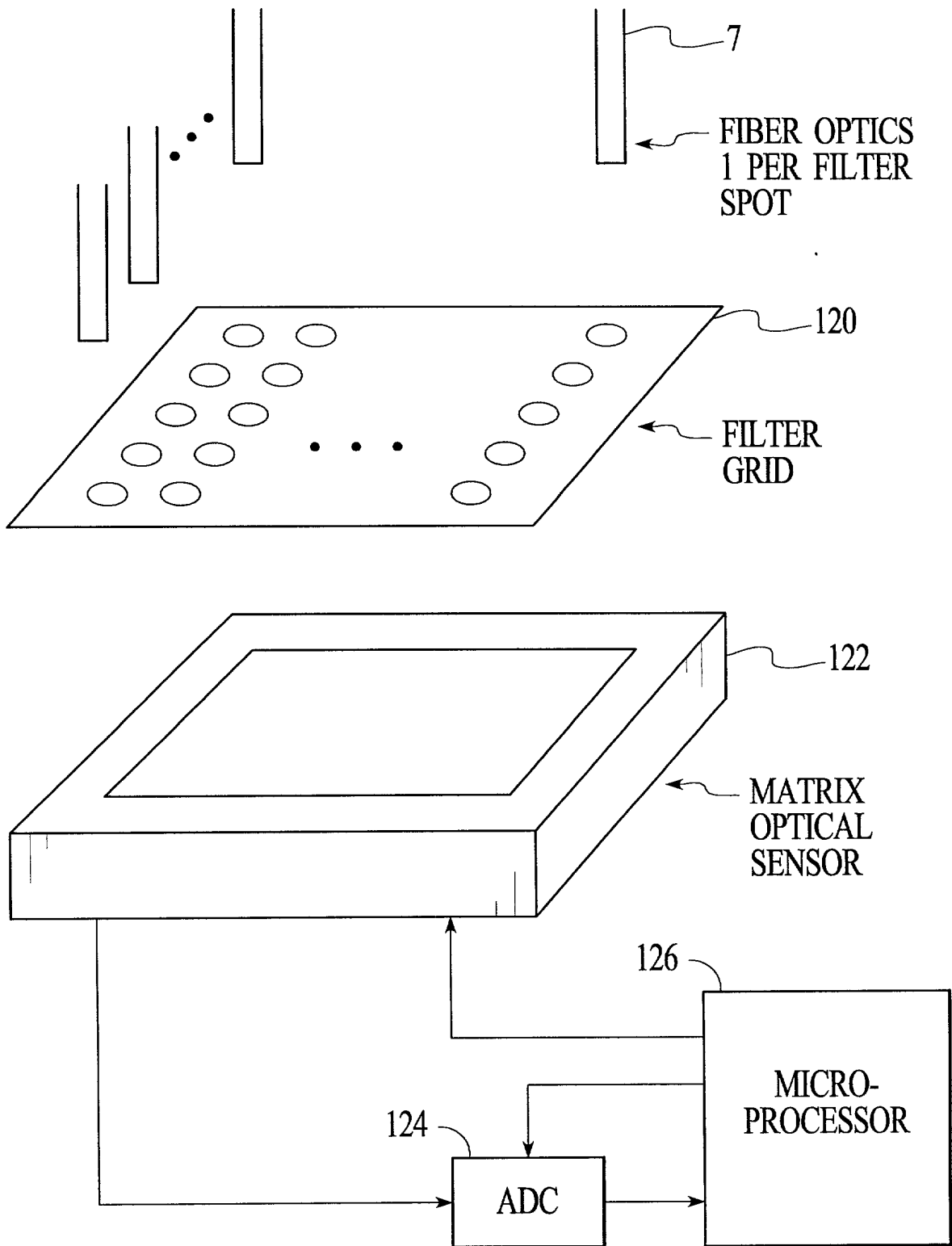


FIG. 12

SINGLE FILTER PROPERTIES (SPECTRUM)

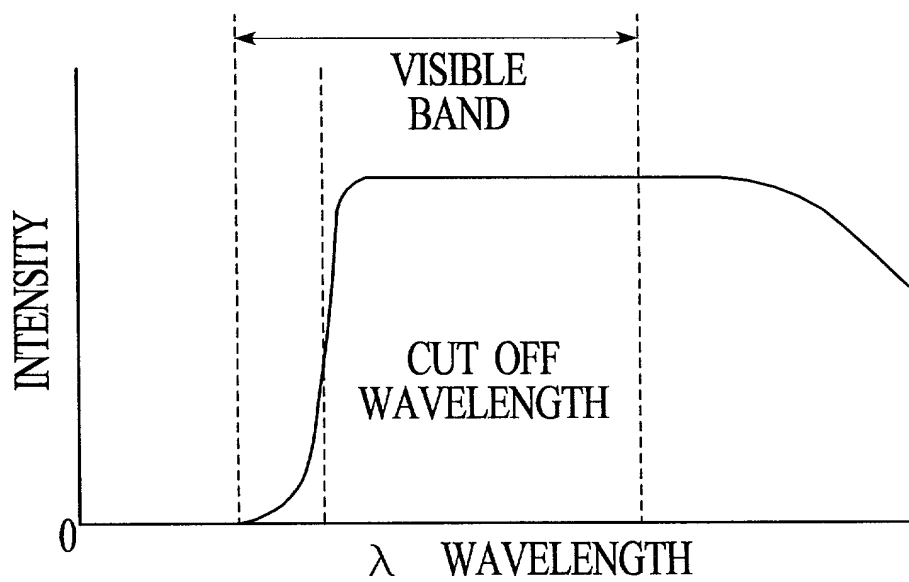


FIG. 13A

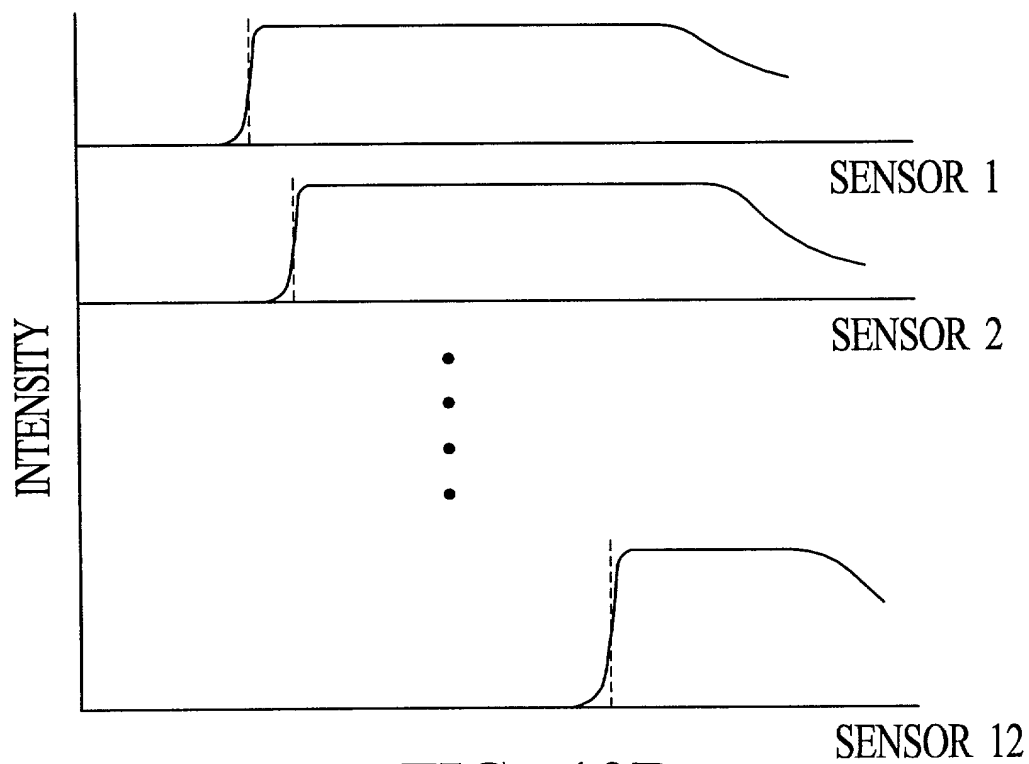


FIG. 13B

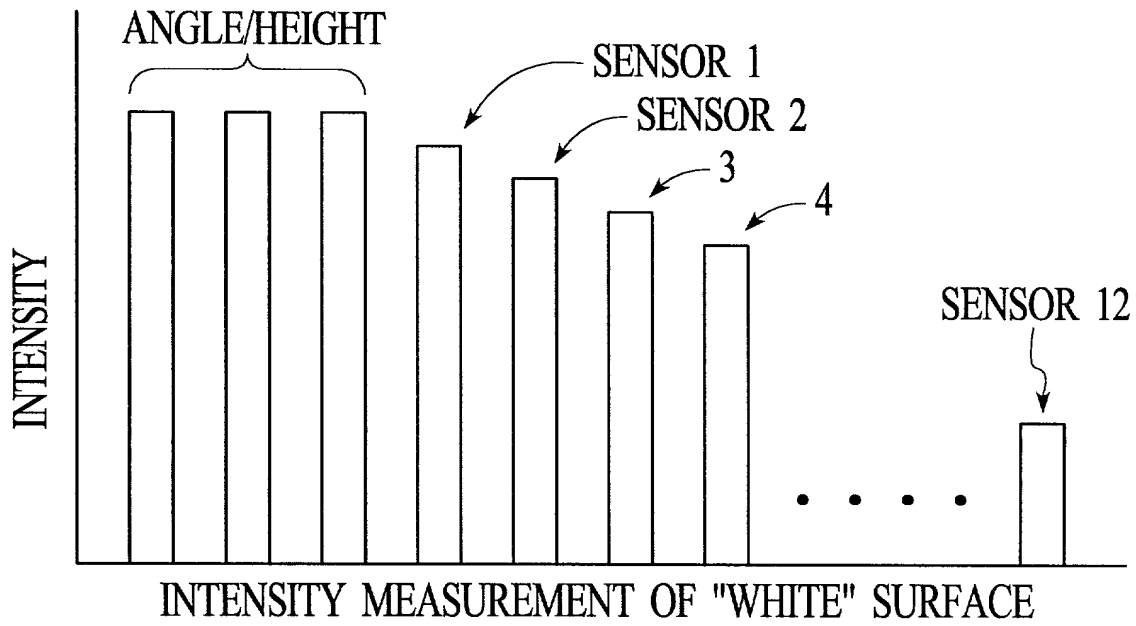


FIG. 14A

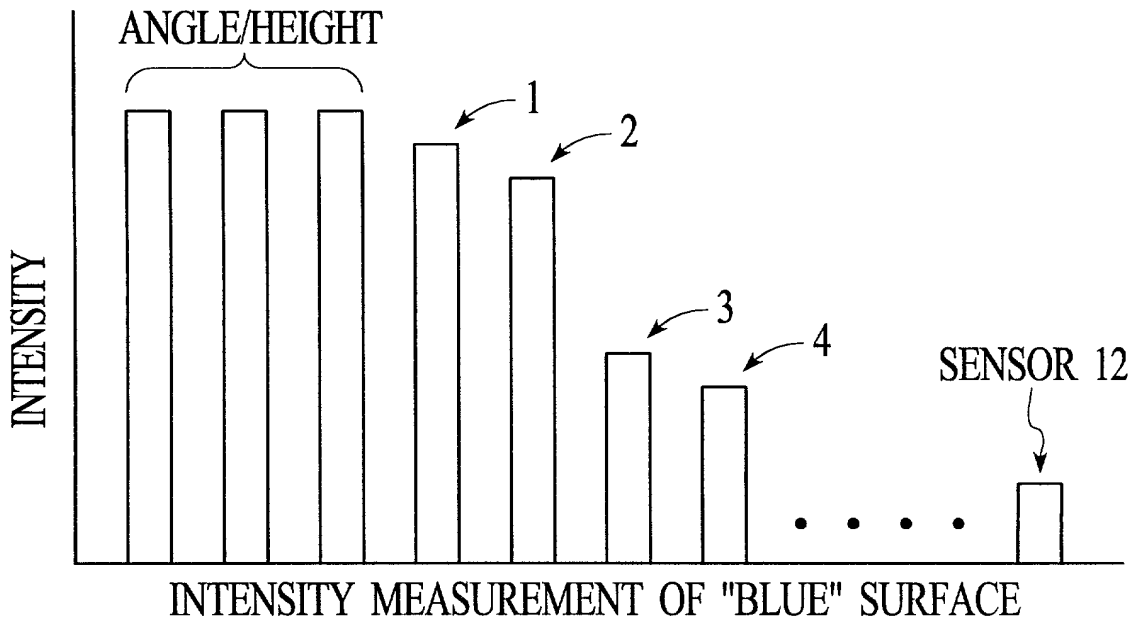


FIG. 14B

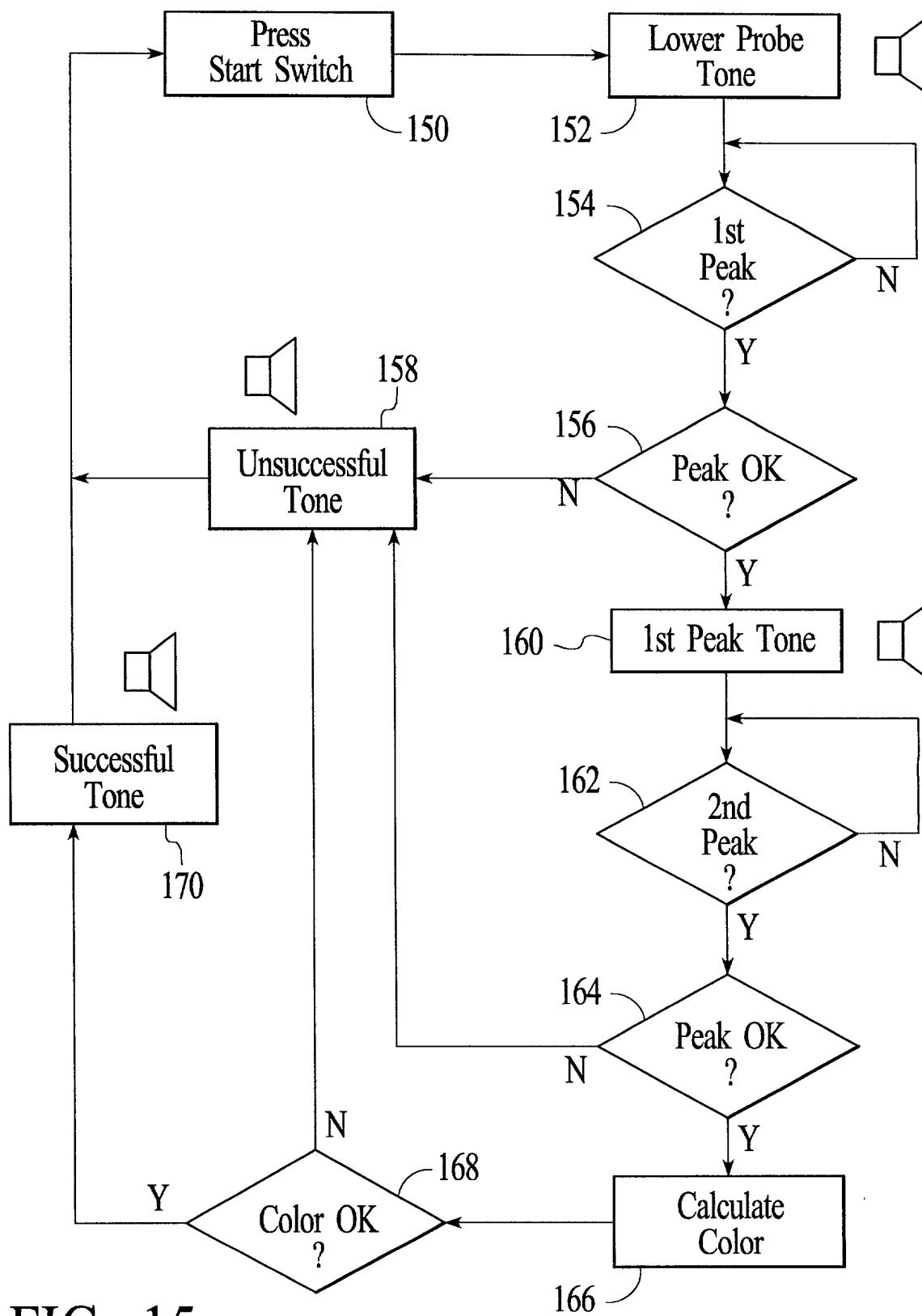


FIG. 15

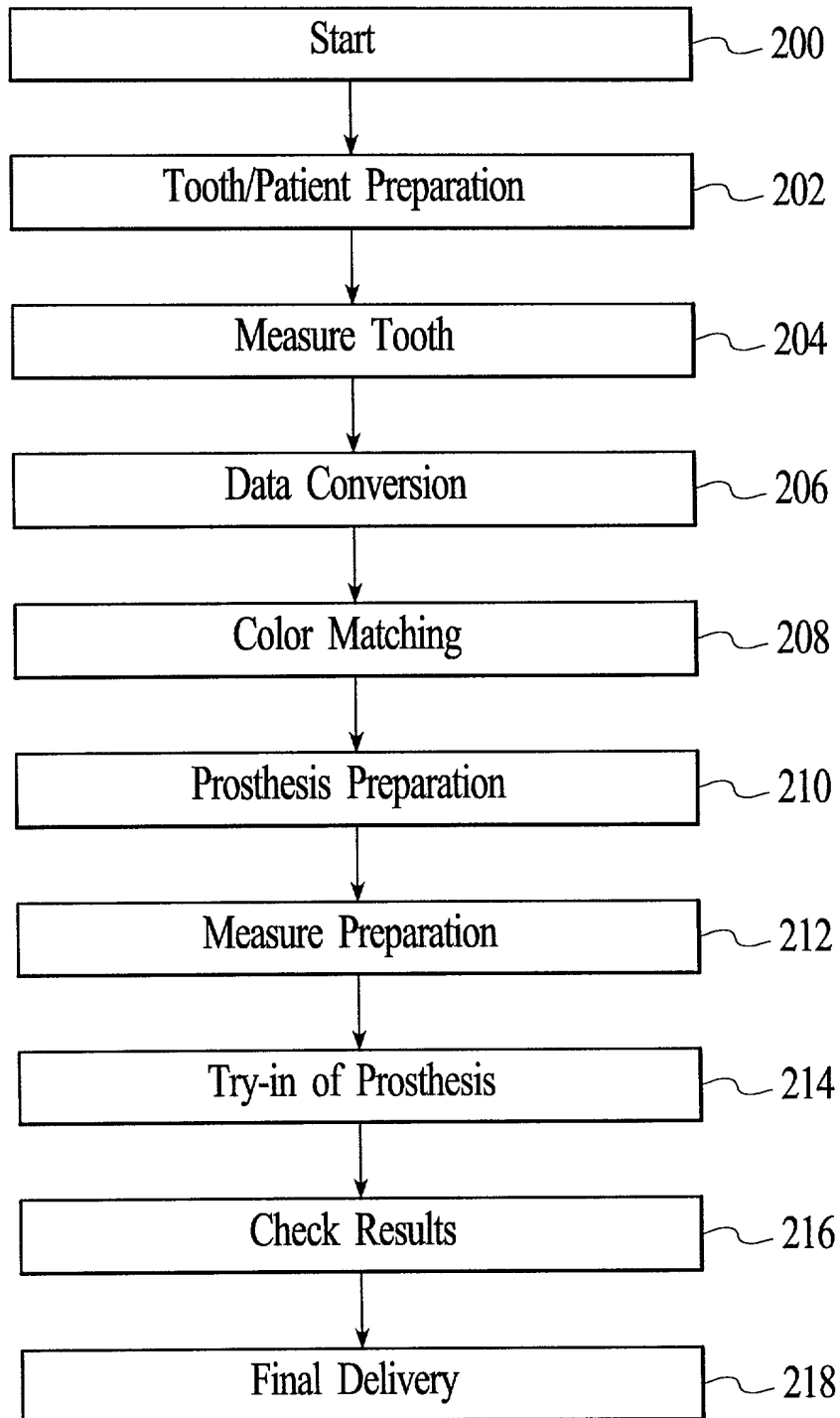


FIG. 16A

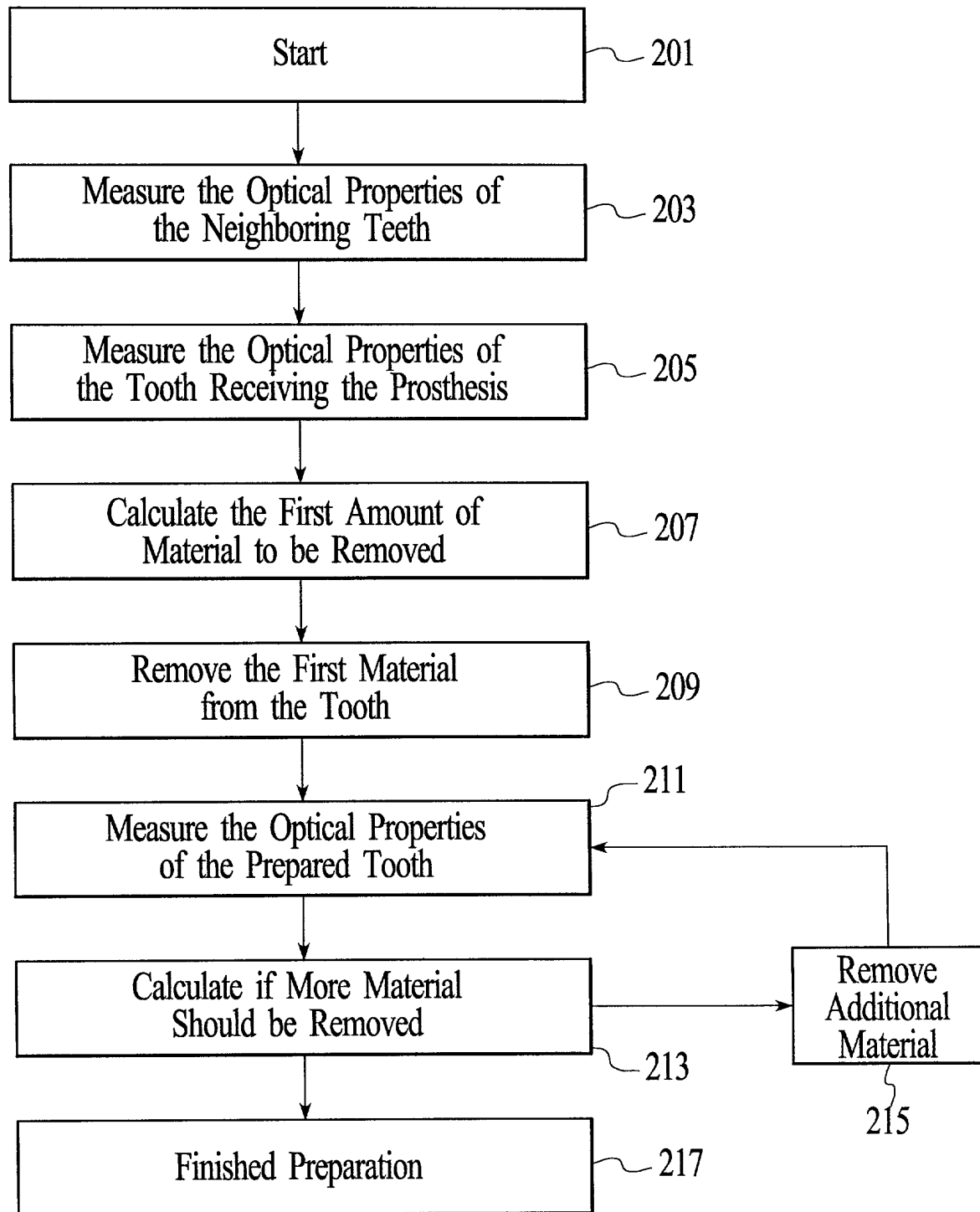


FIG. 16B

INTRAORAL POSITIONING DEVICE

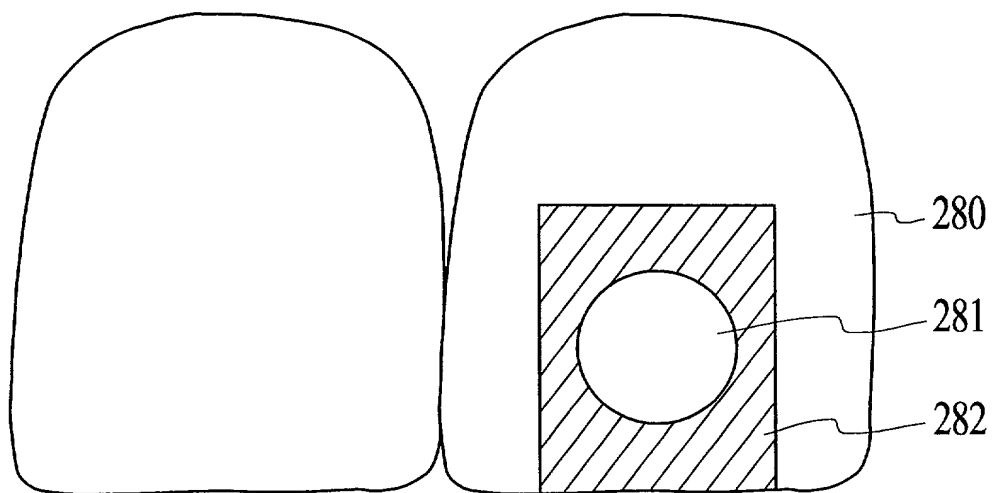


FIG. 17A

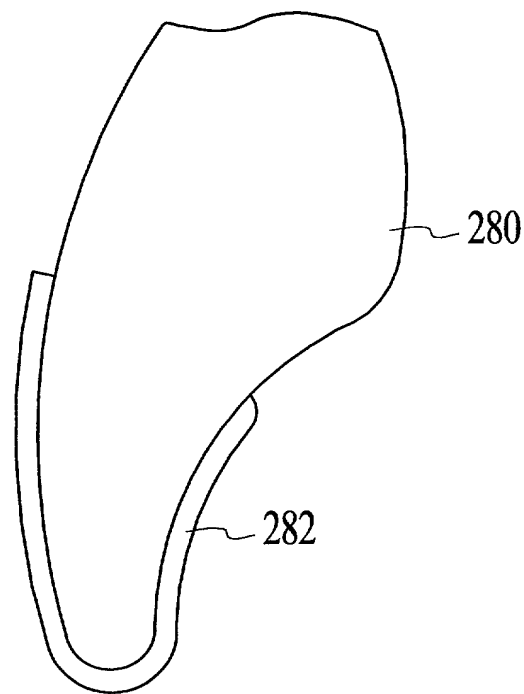


FIG. 17B

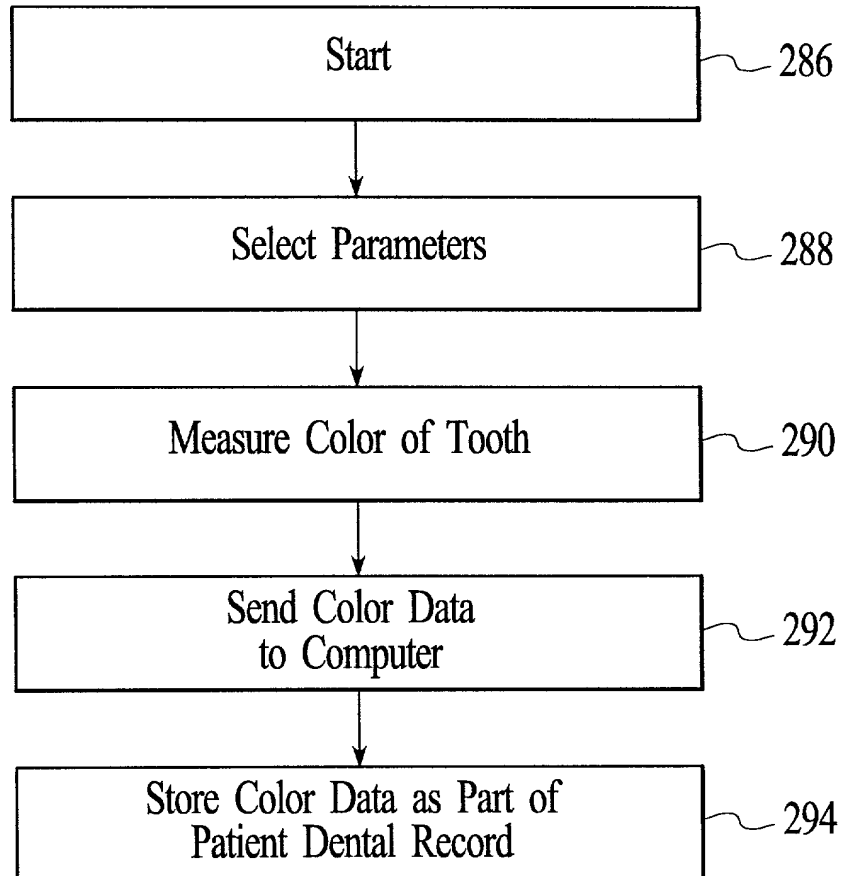


FIG. 18

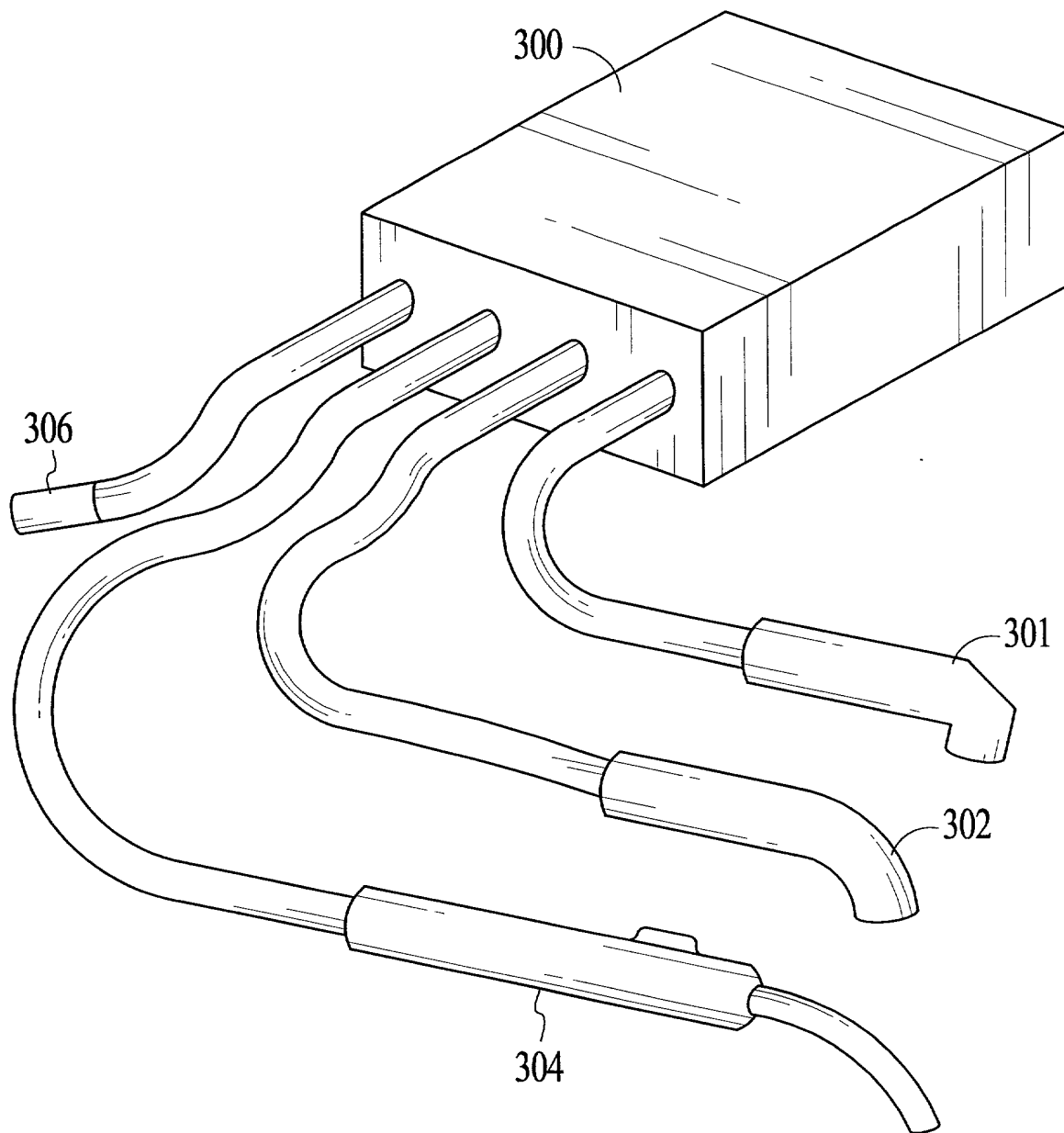


FIG. 19

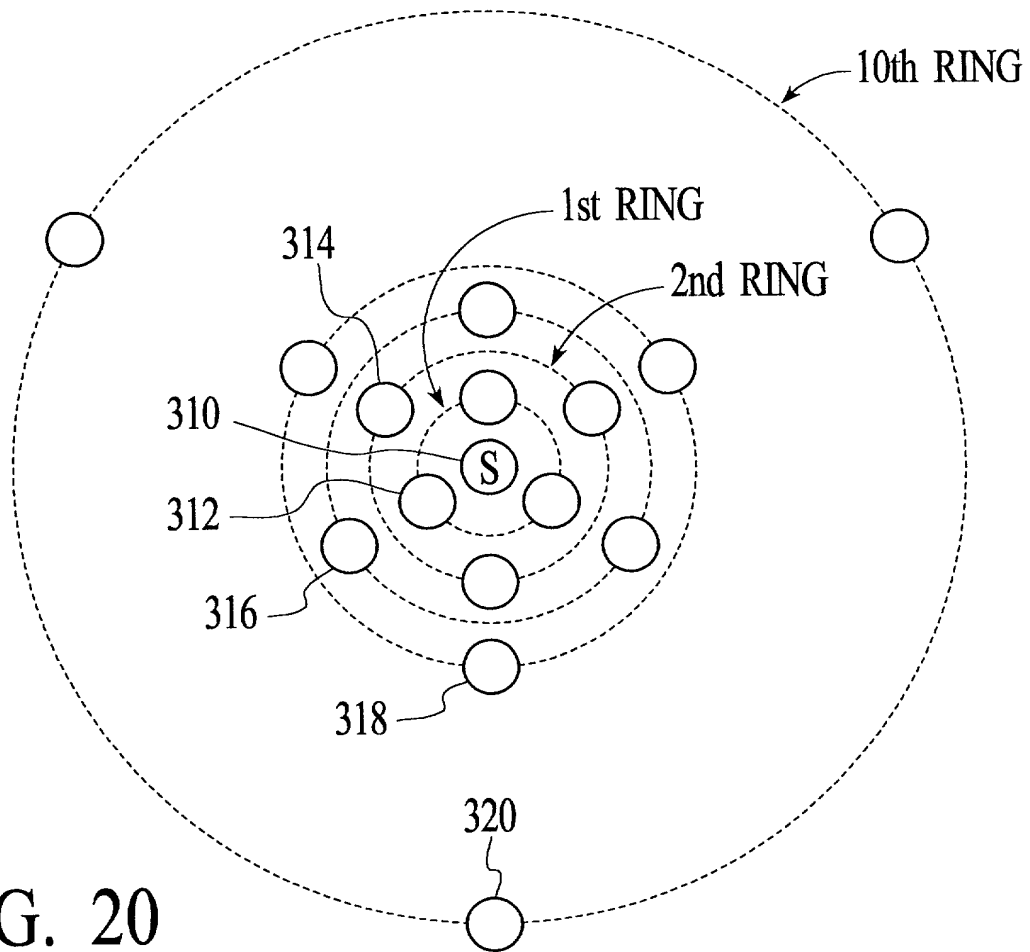


FIG. 20

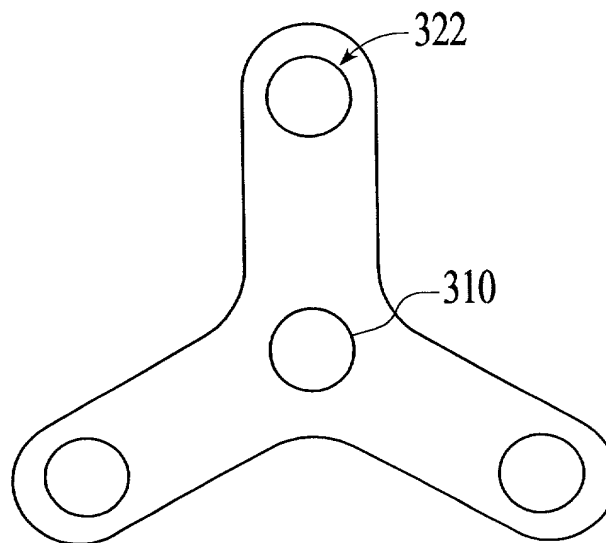


FIG. 21

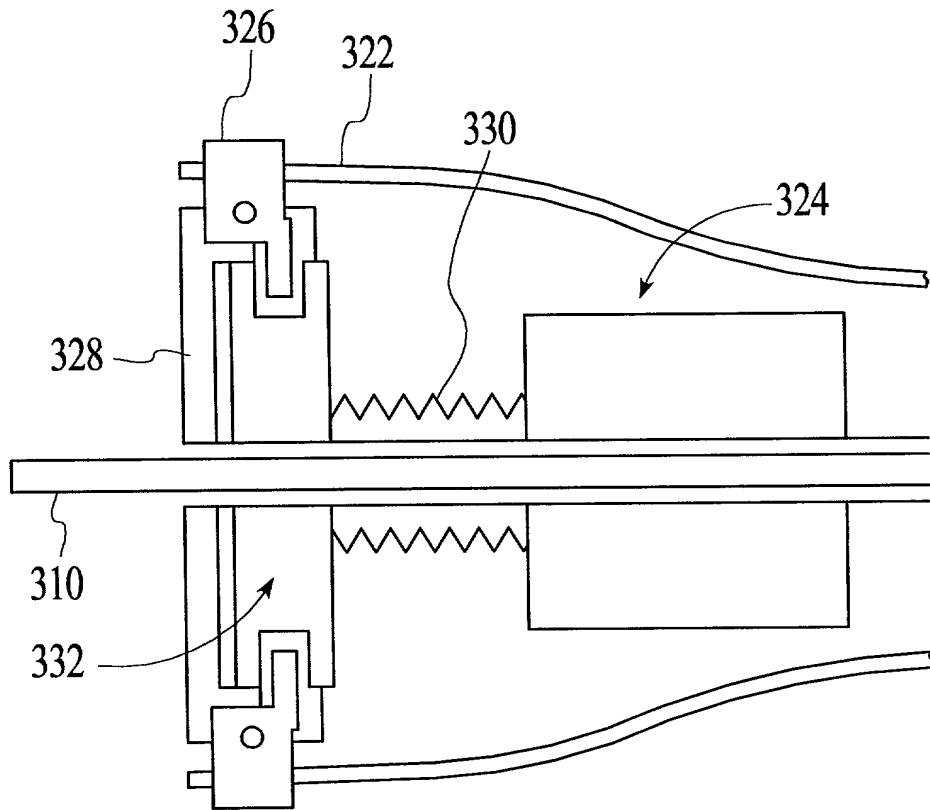
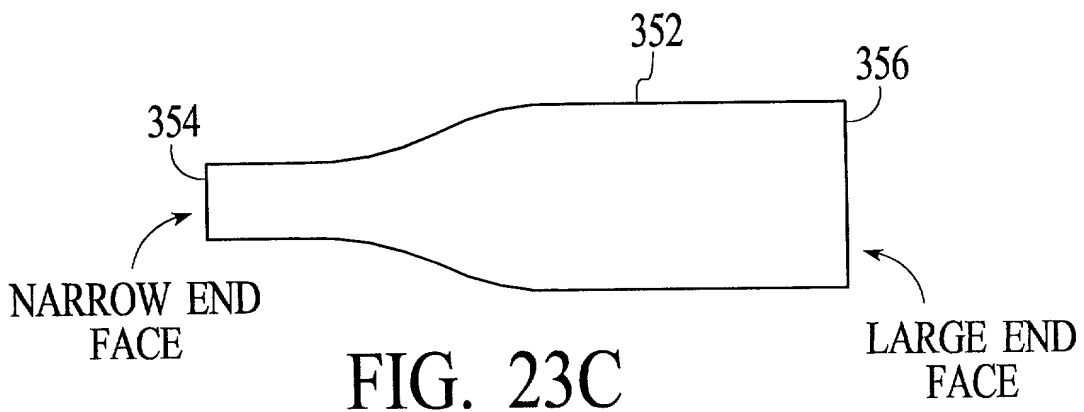
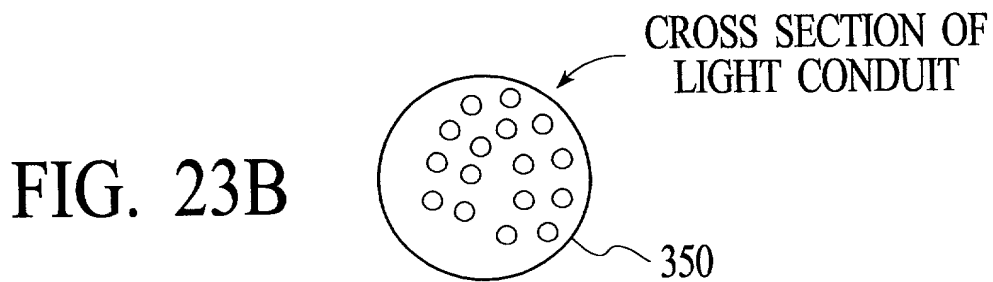
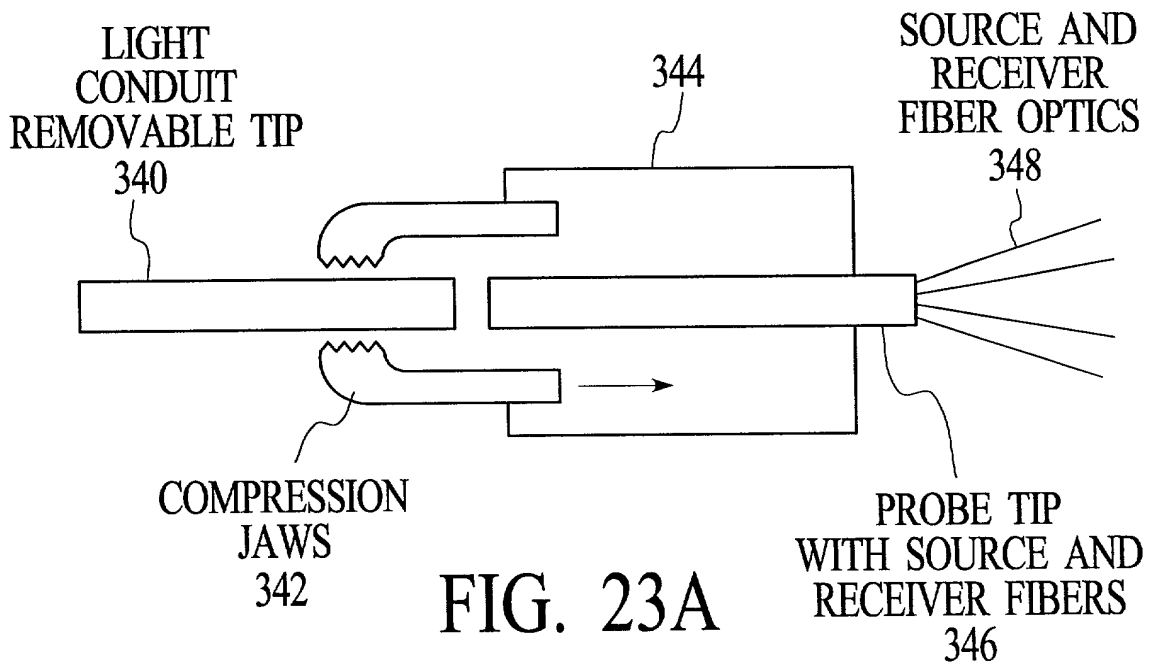


FIG. 22



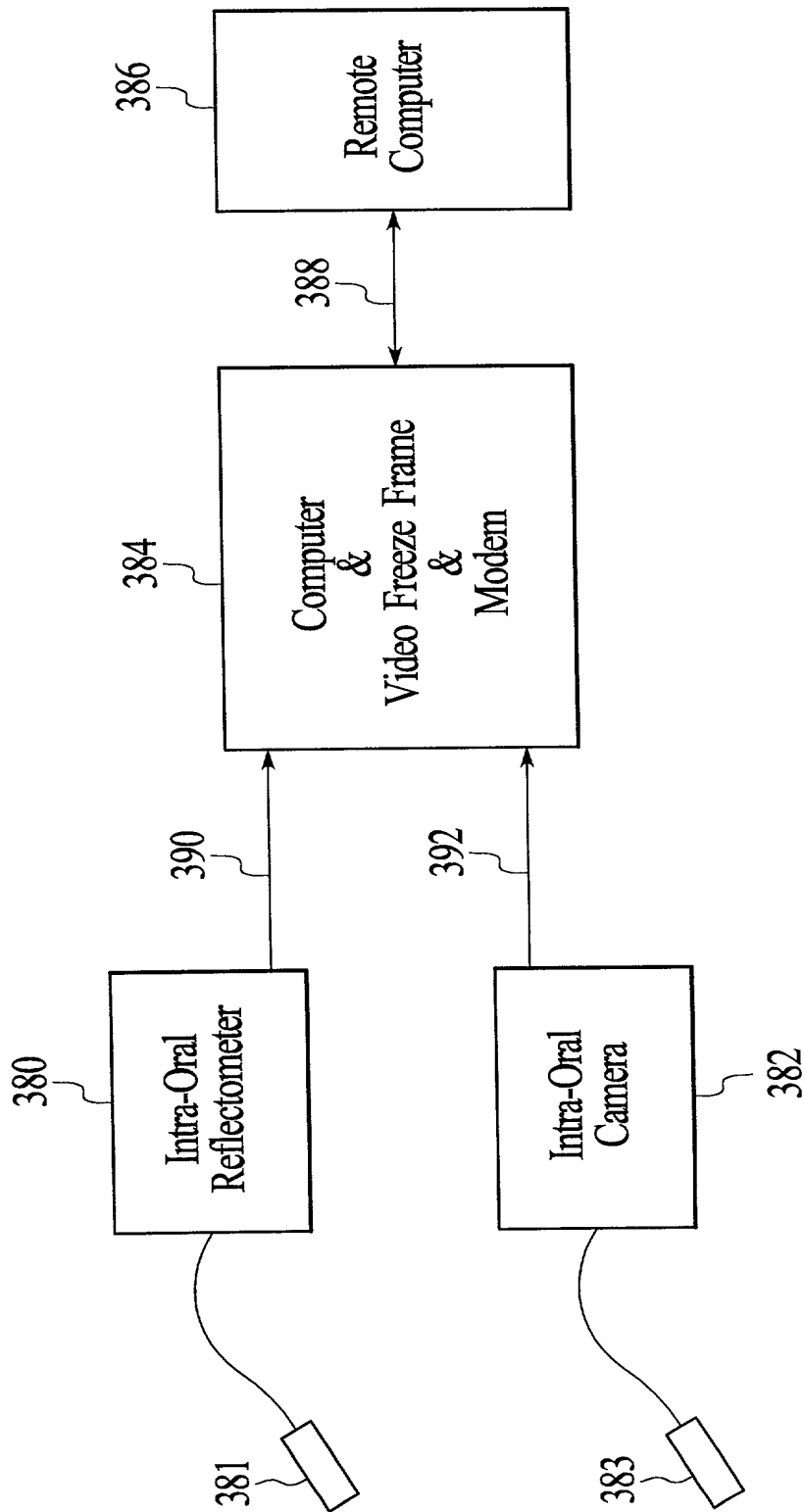


FIG. 24

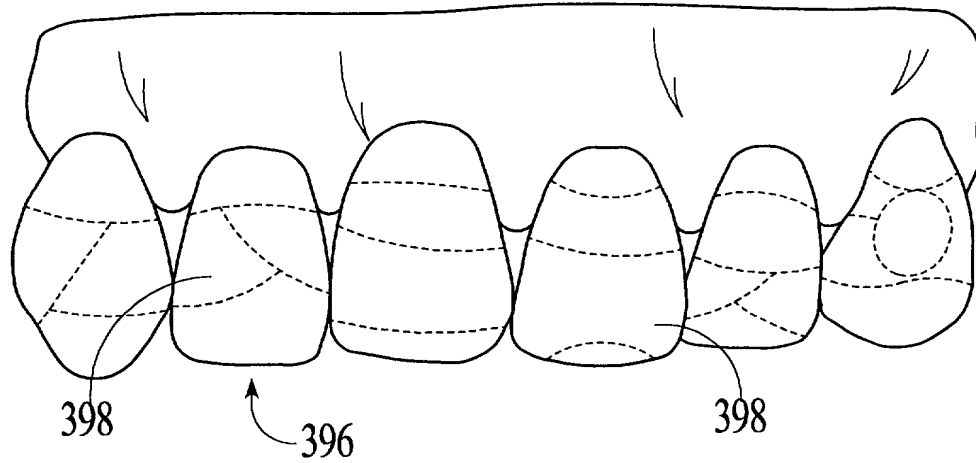


FIG. 25

VIDEO IMAGE

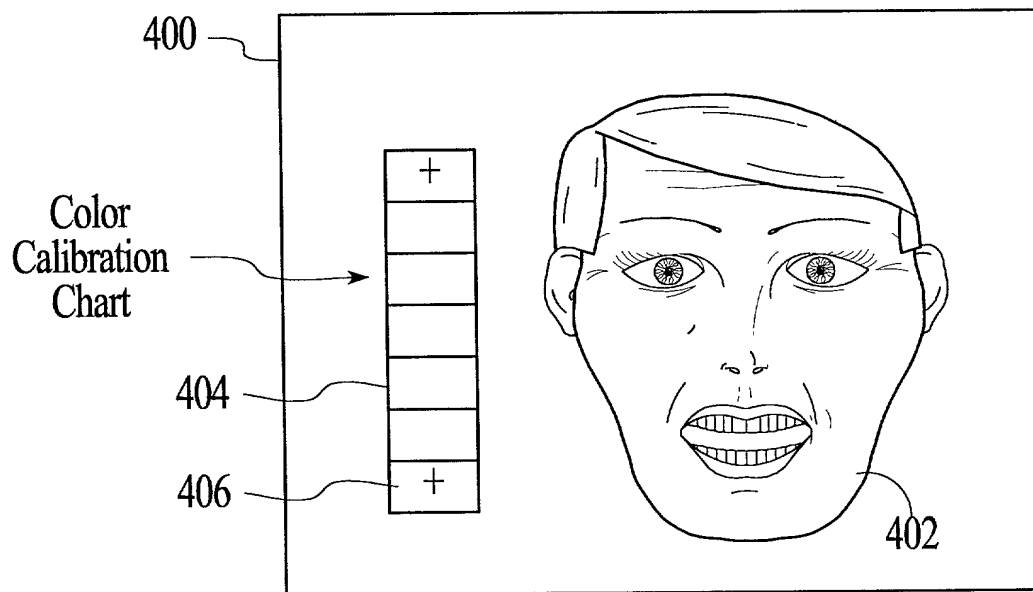


FIG. 26

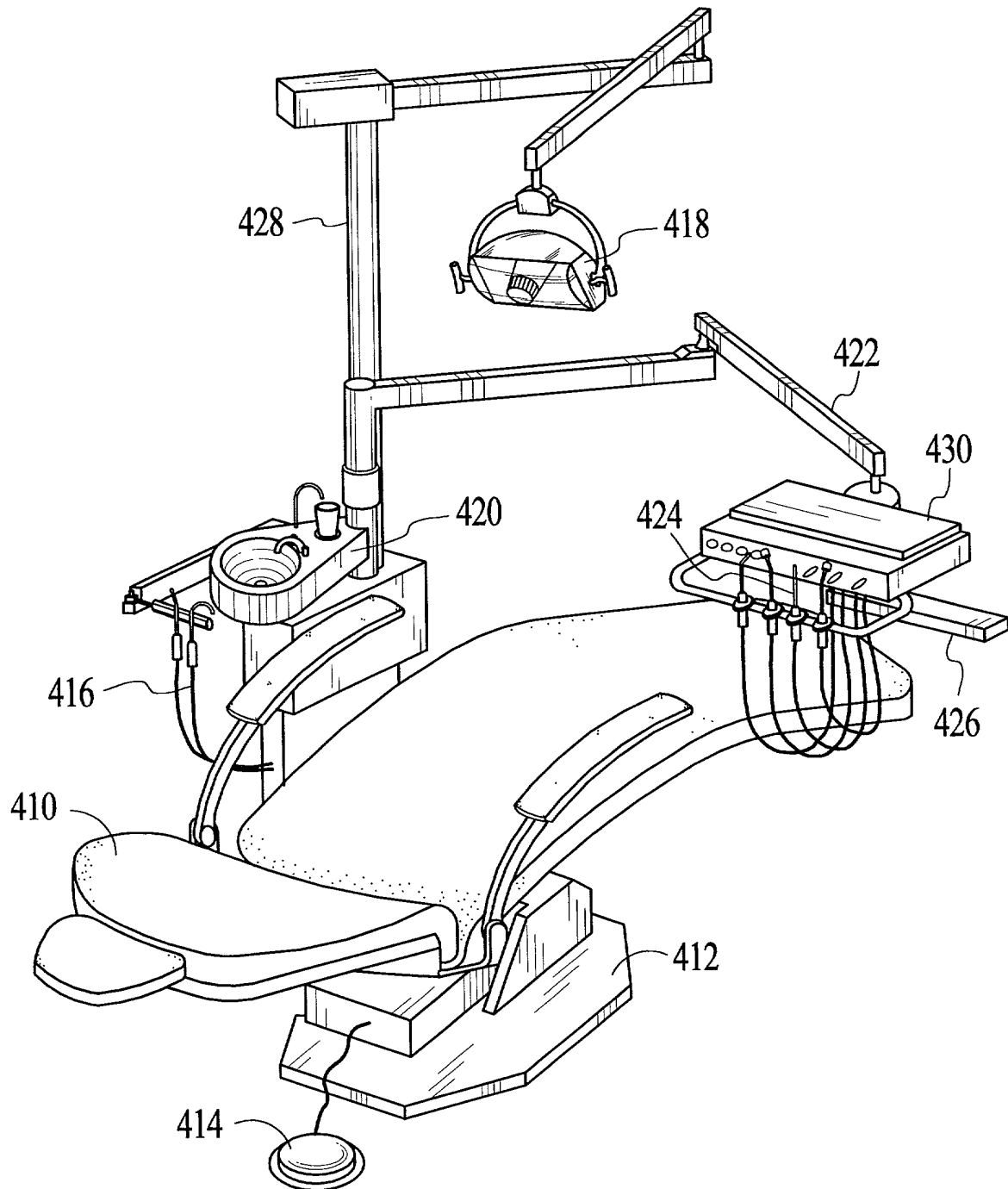


FIG. 27

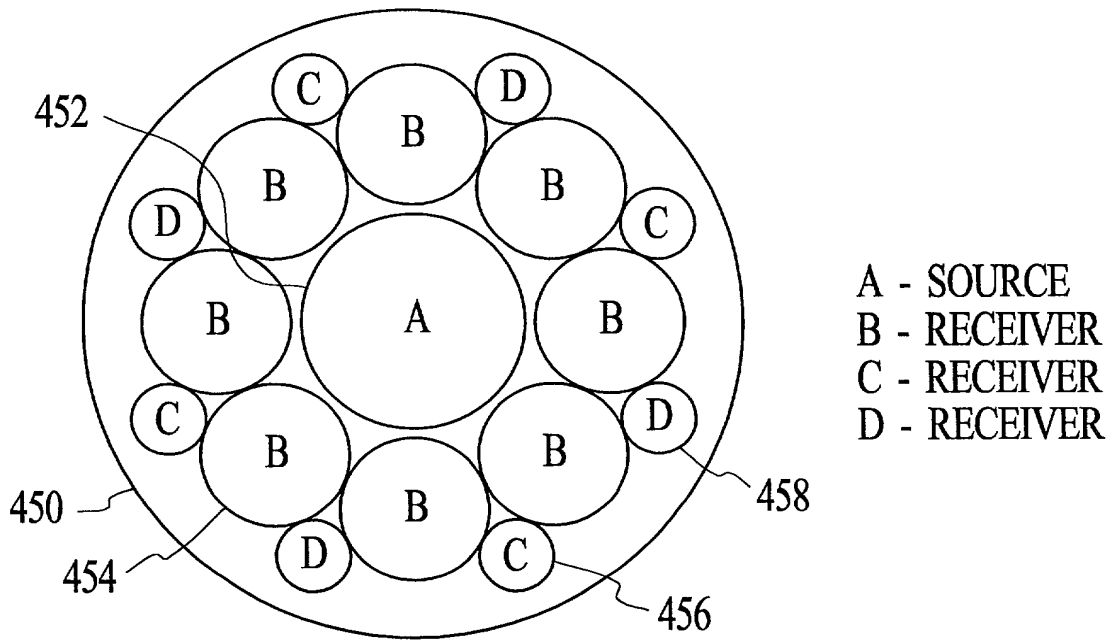


FIG. 28A

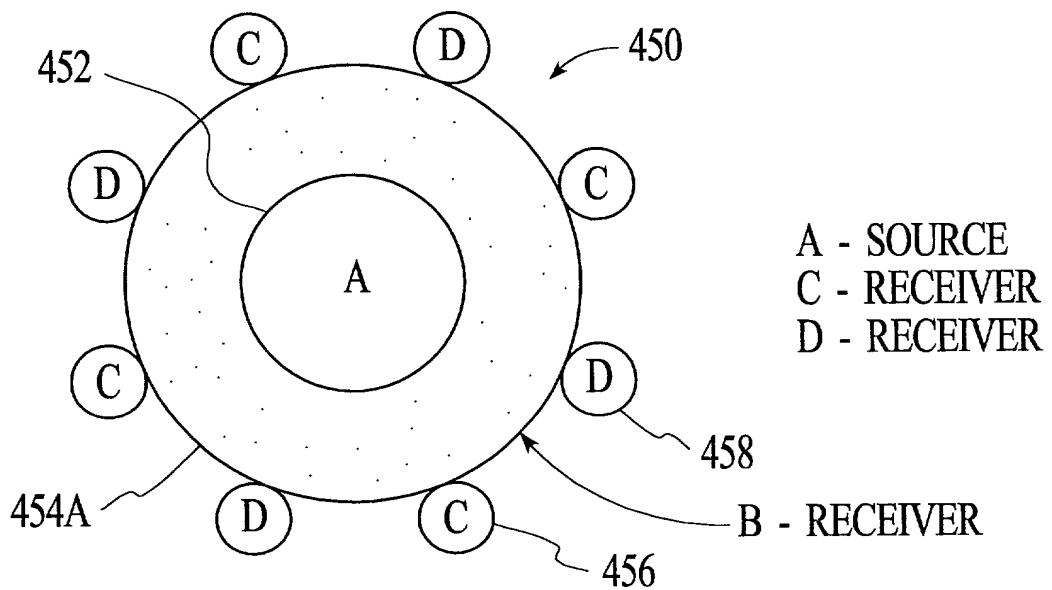


FIG. 28B

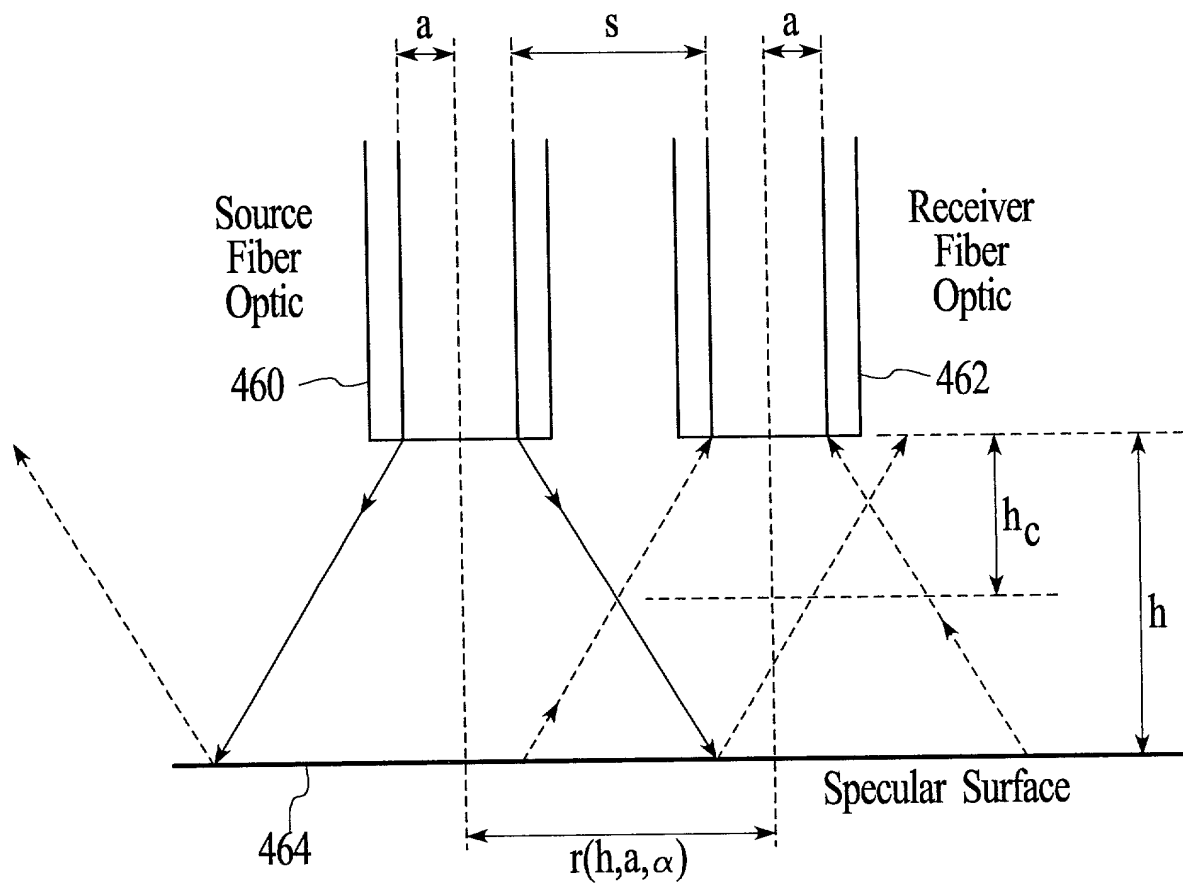


FIG. 29

FIG. 30A

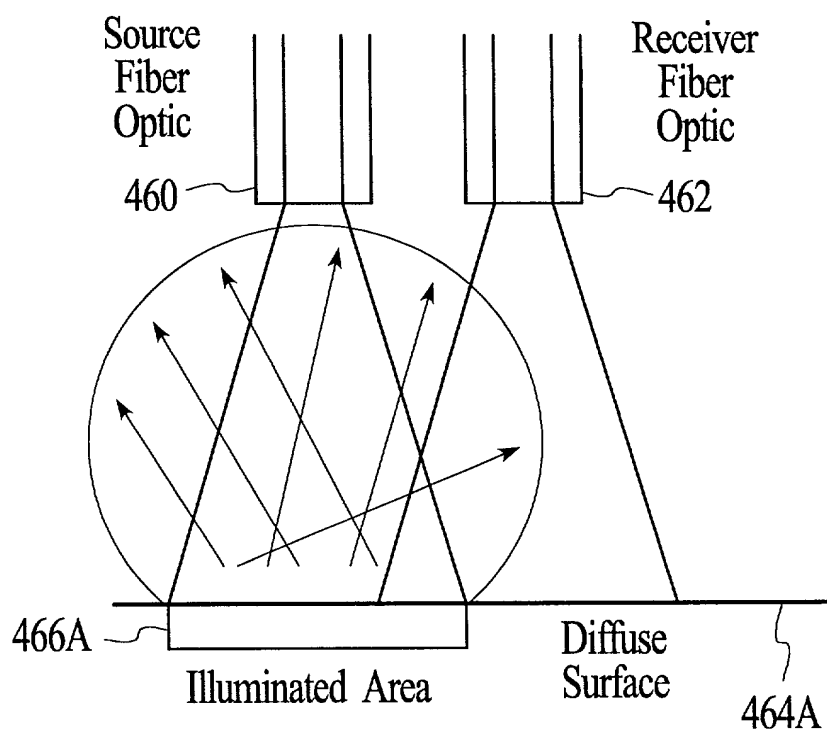
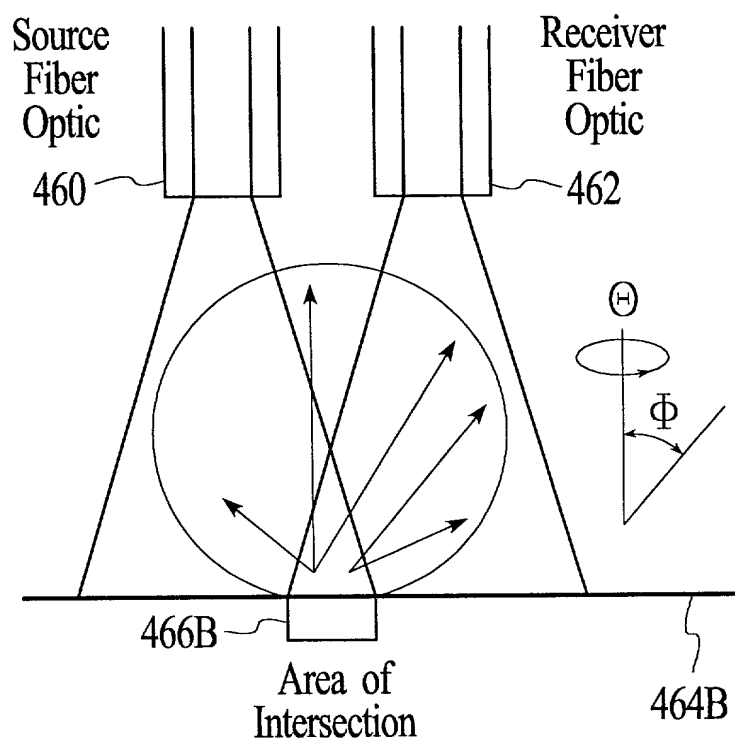


FIG. 30B



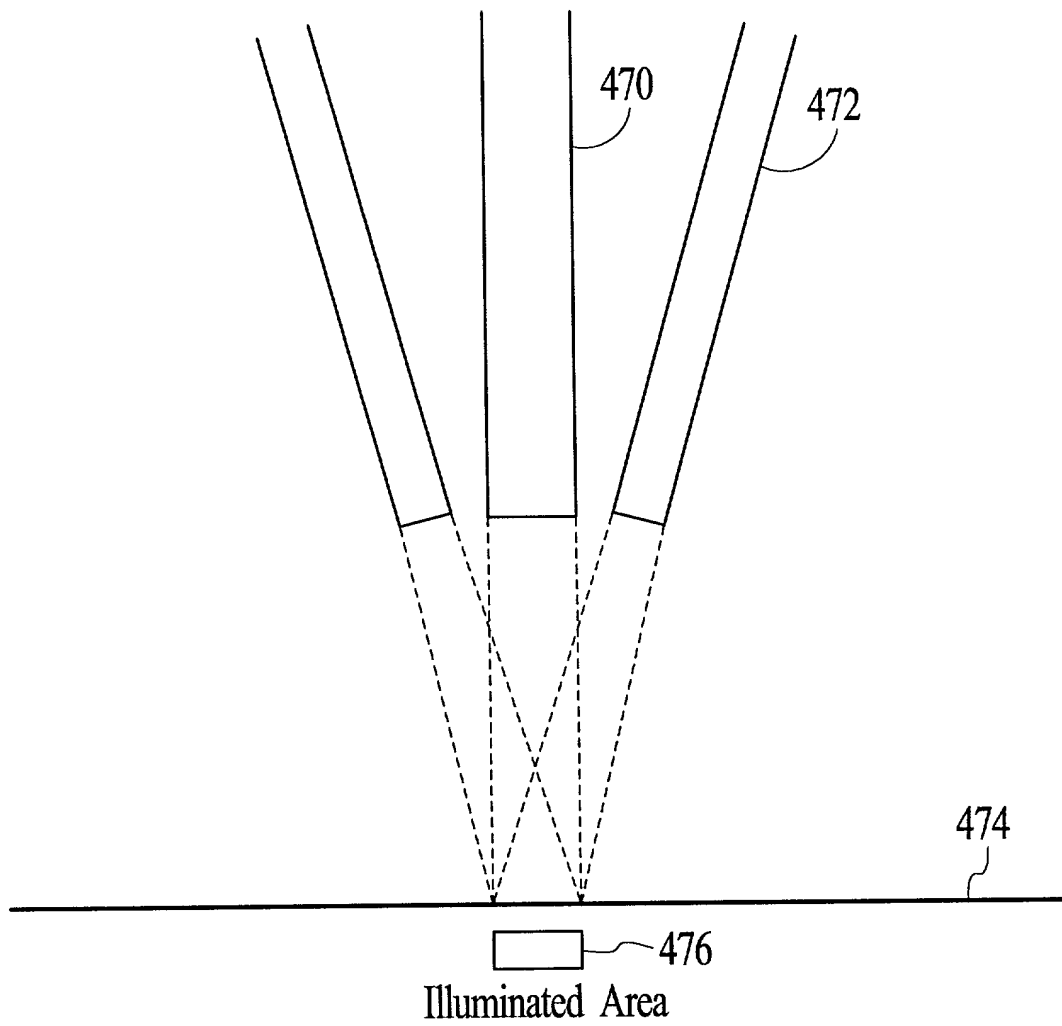


FIG. 31A

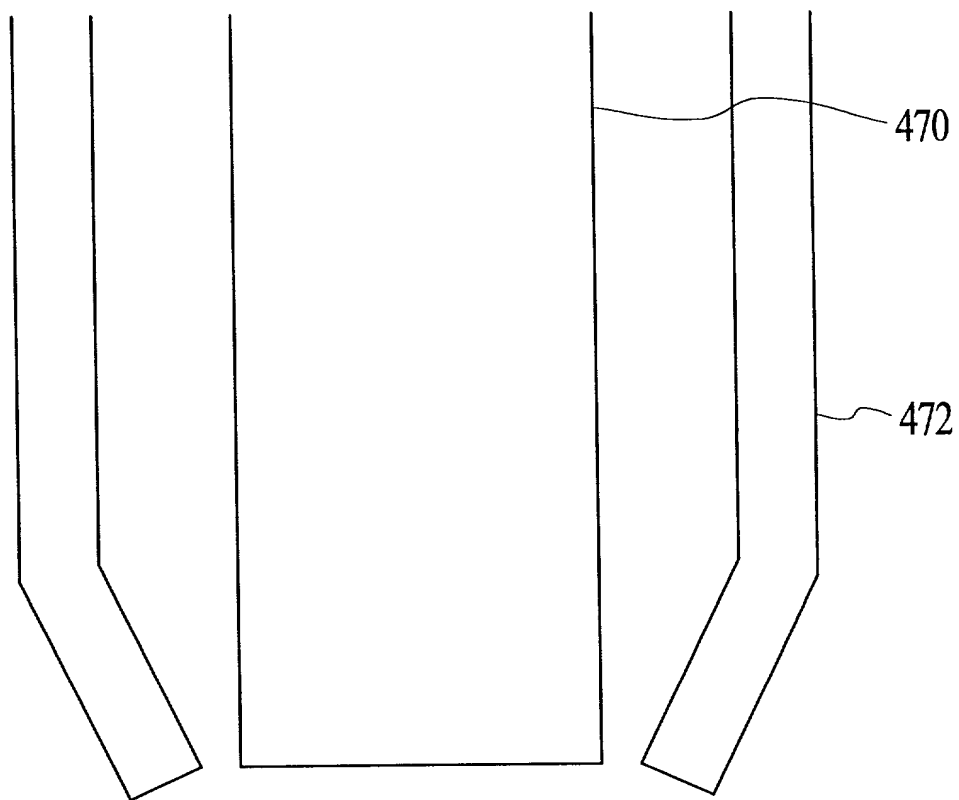


FIG. 31B

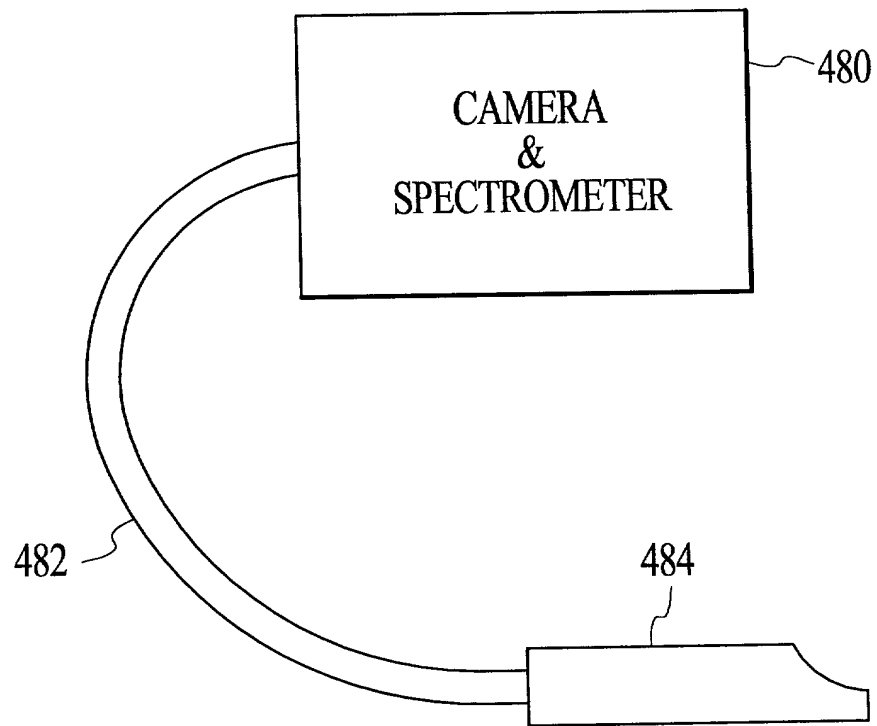


FIG. 32

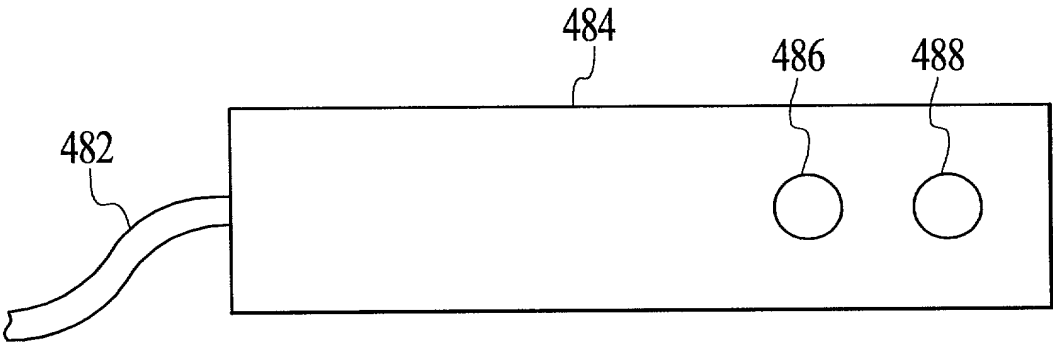


FIG. 33

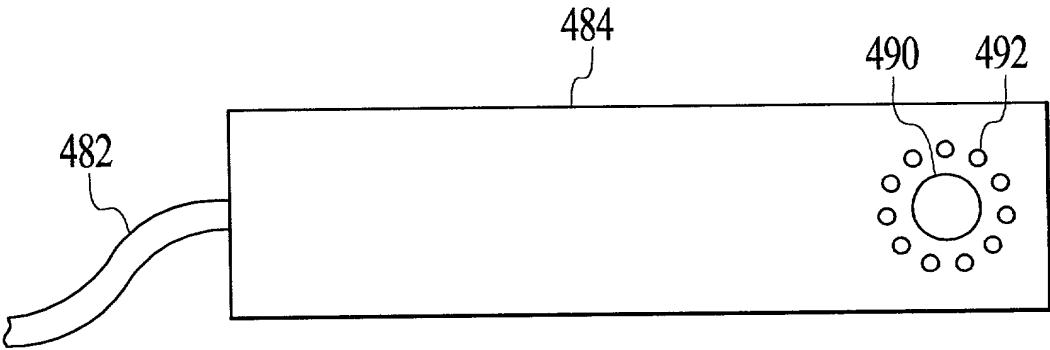


FIG. 34

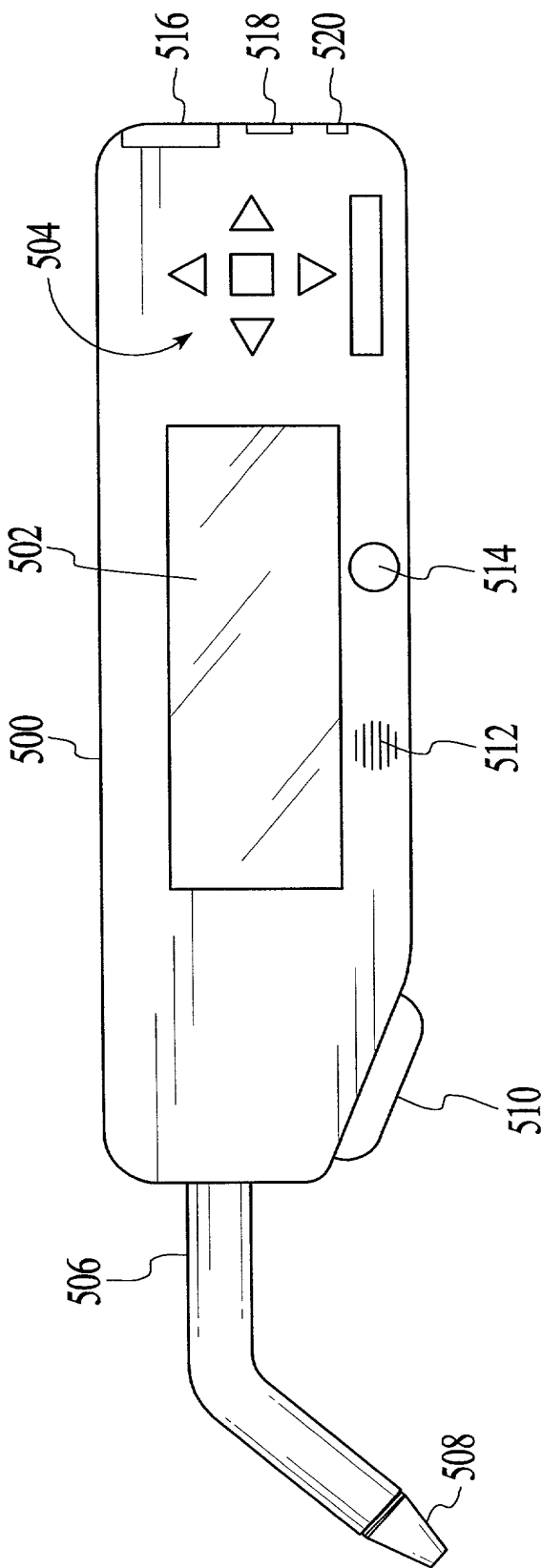
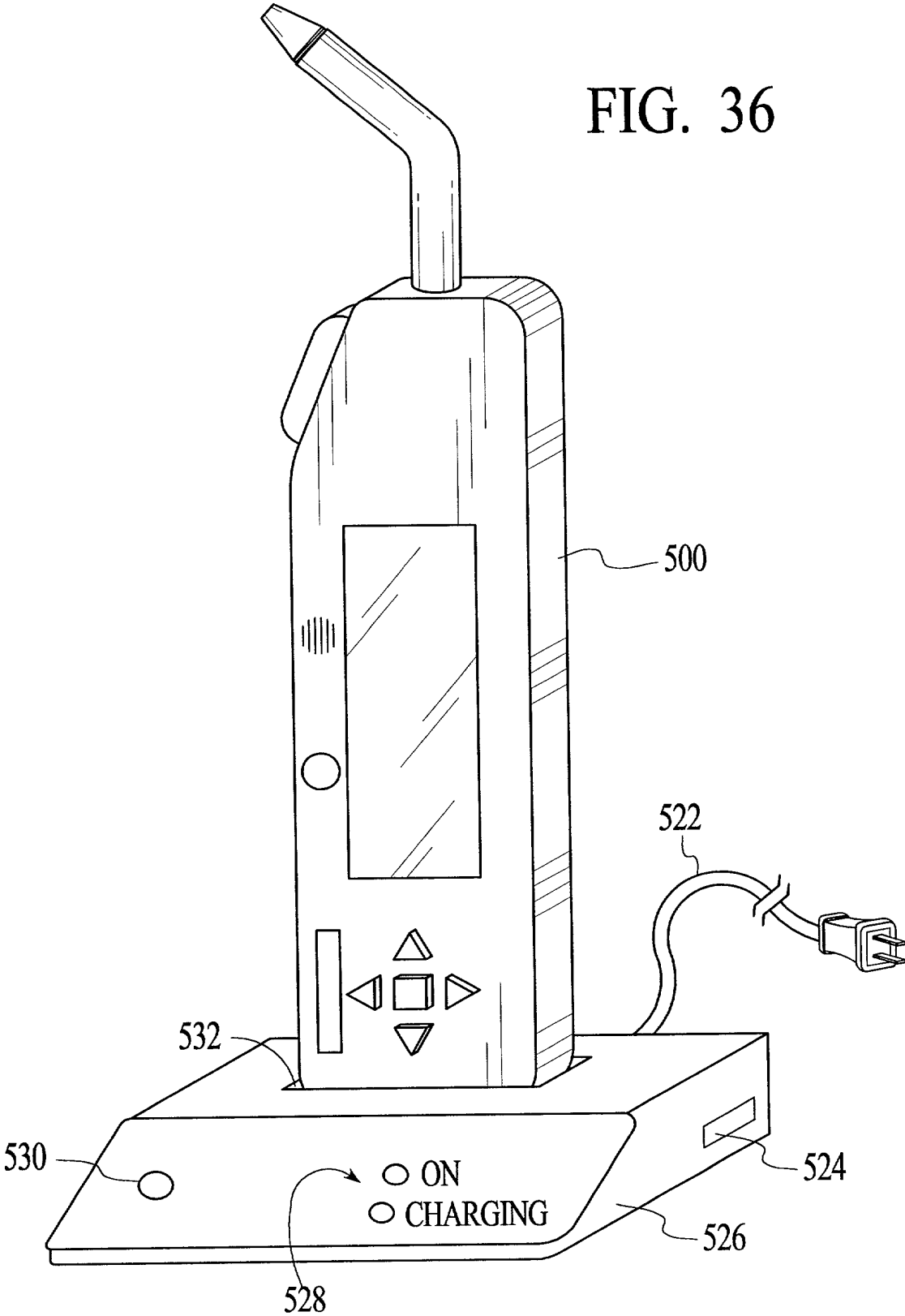
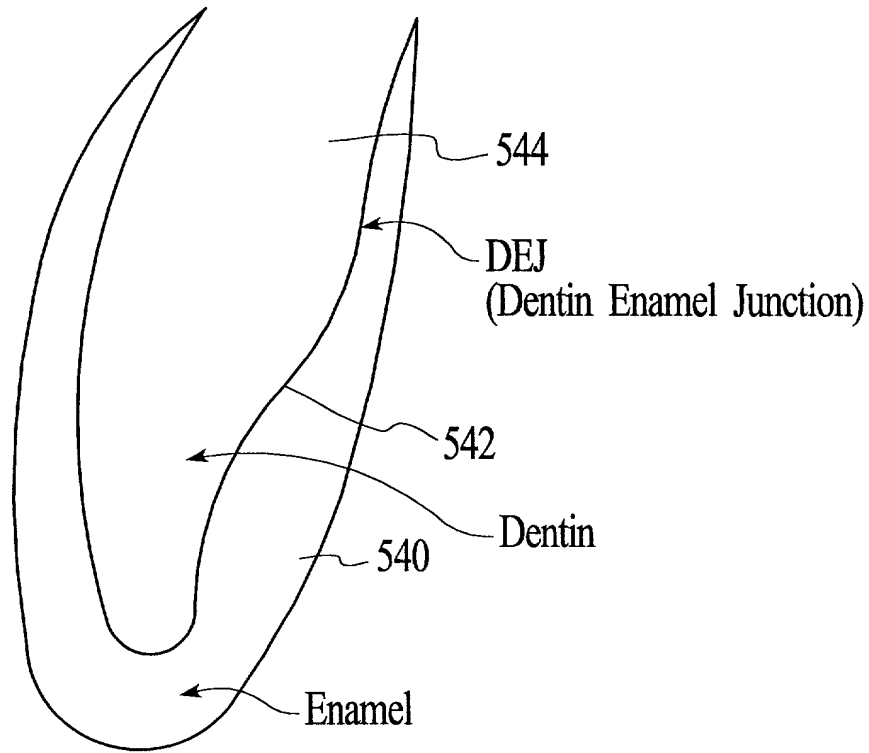


FIG. 35

FIG. 36





Enamel - Dentin Layers

LIGHT REFLECTION AND SCATTERING

FIG. 37A

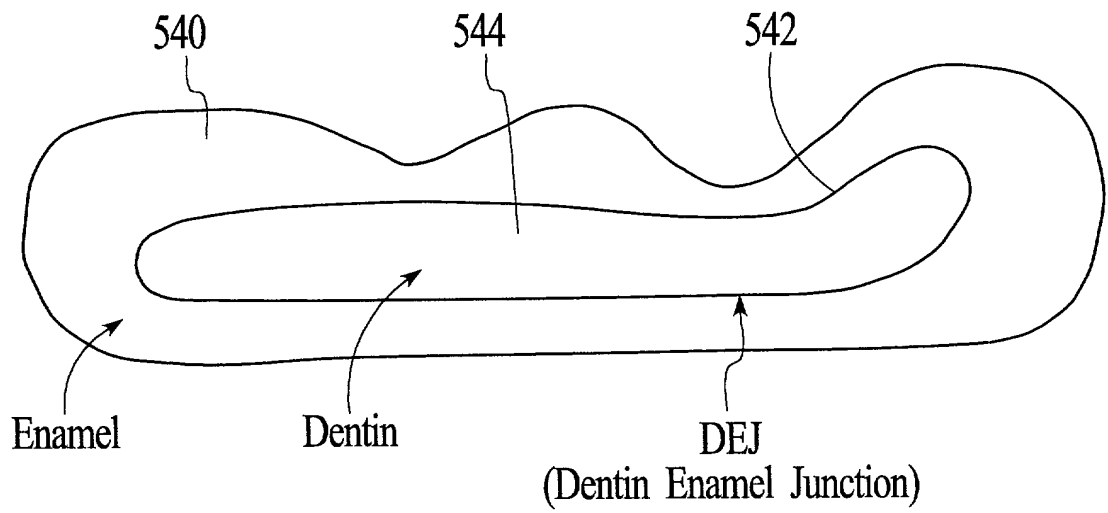
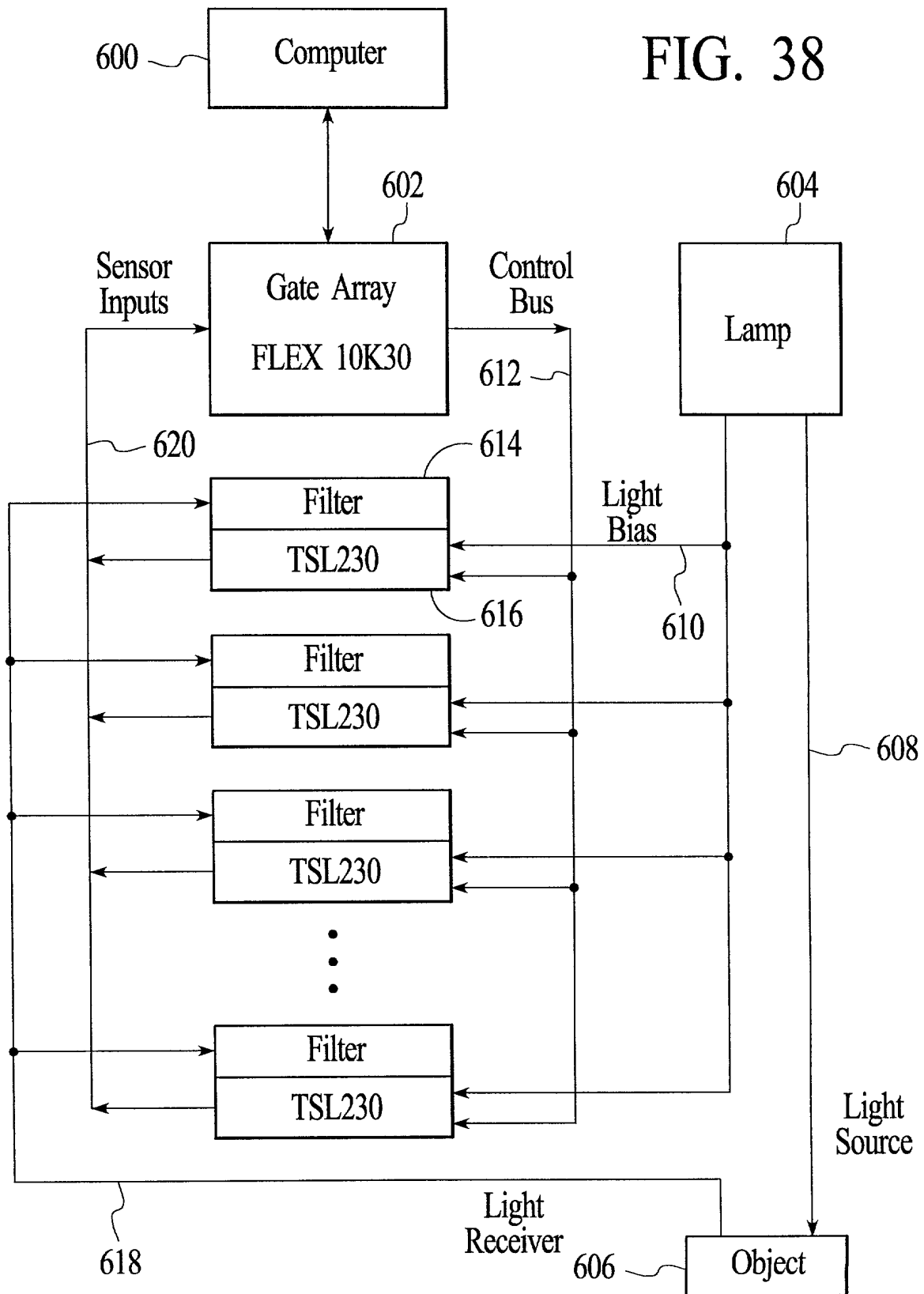


FIG. 37B

FIG. 38



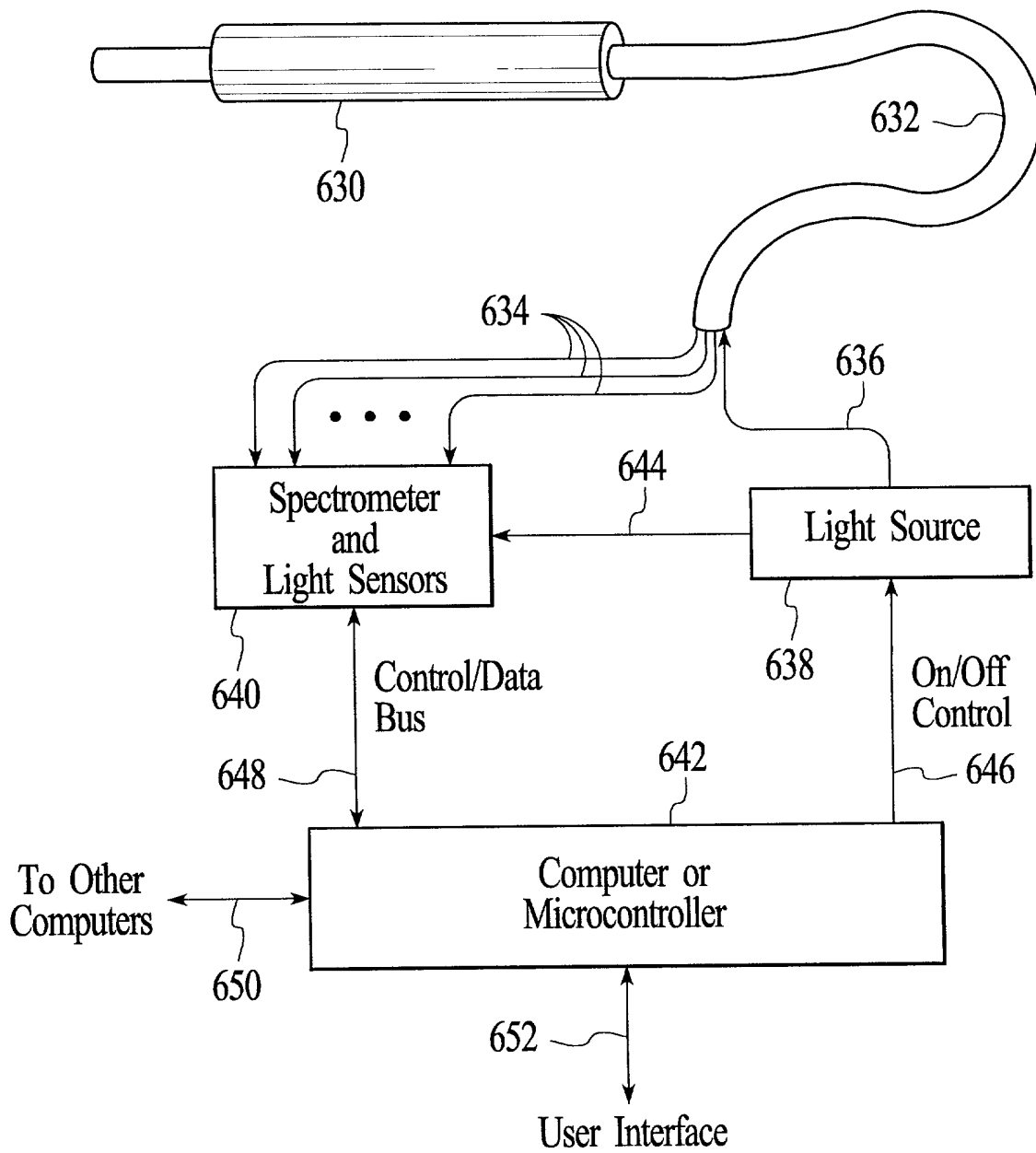


FIG. 39

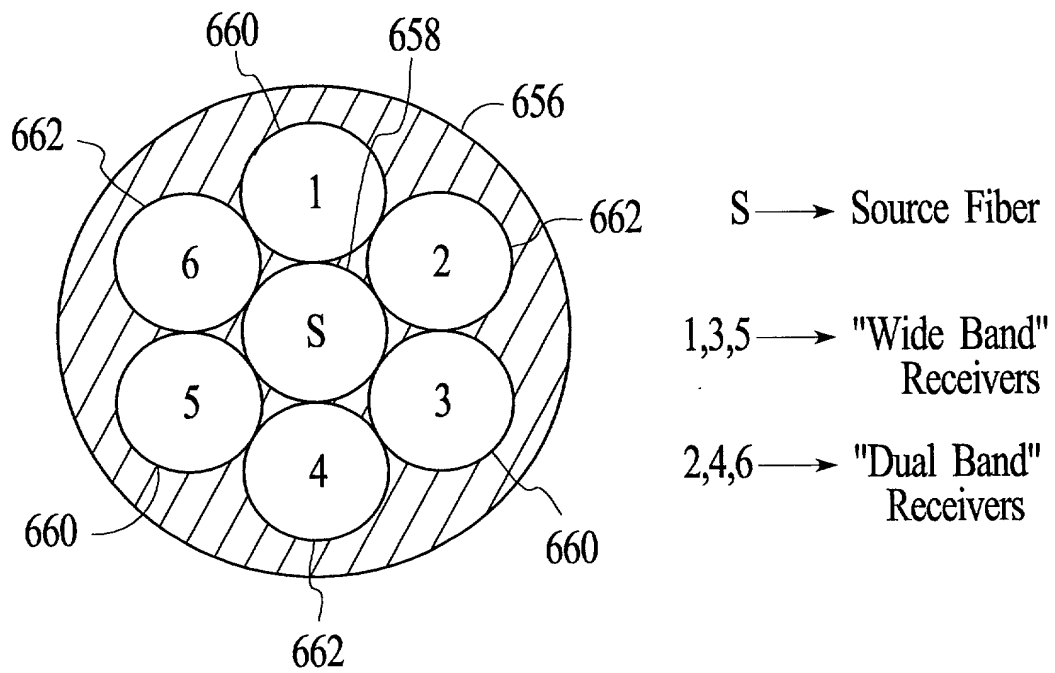


FIG. 40

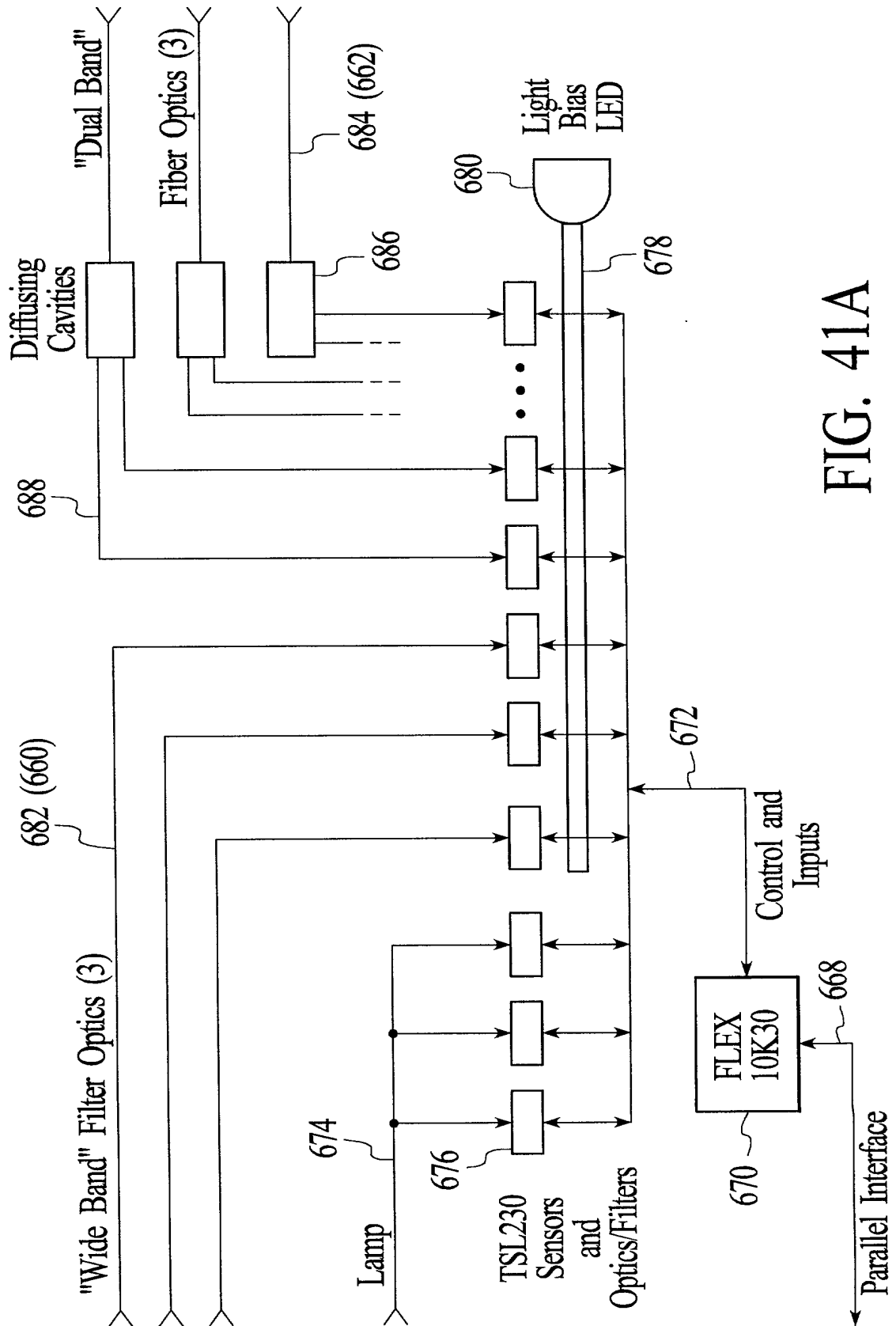


FIG. 41A

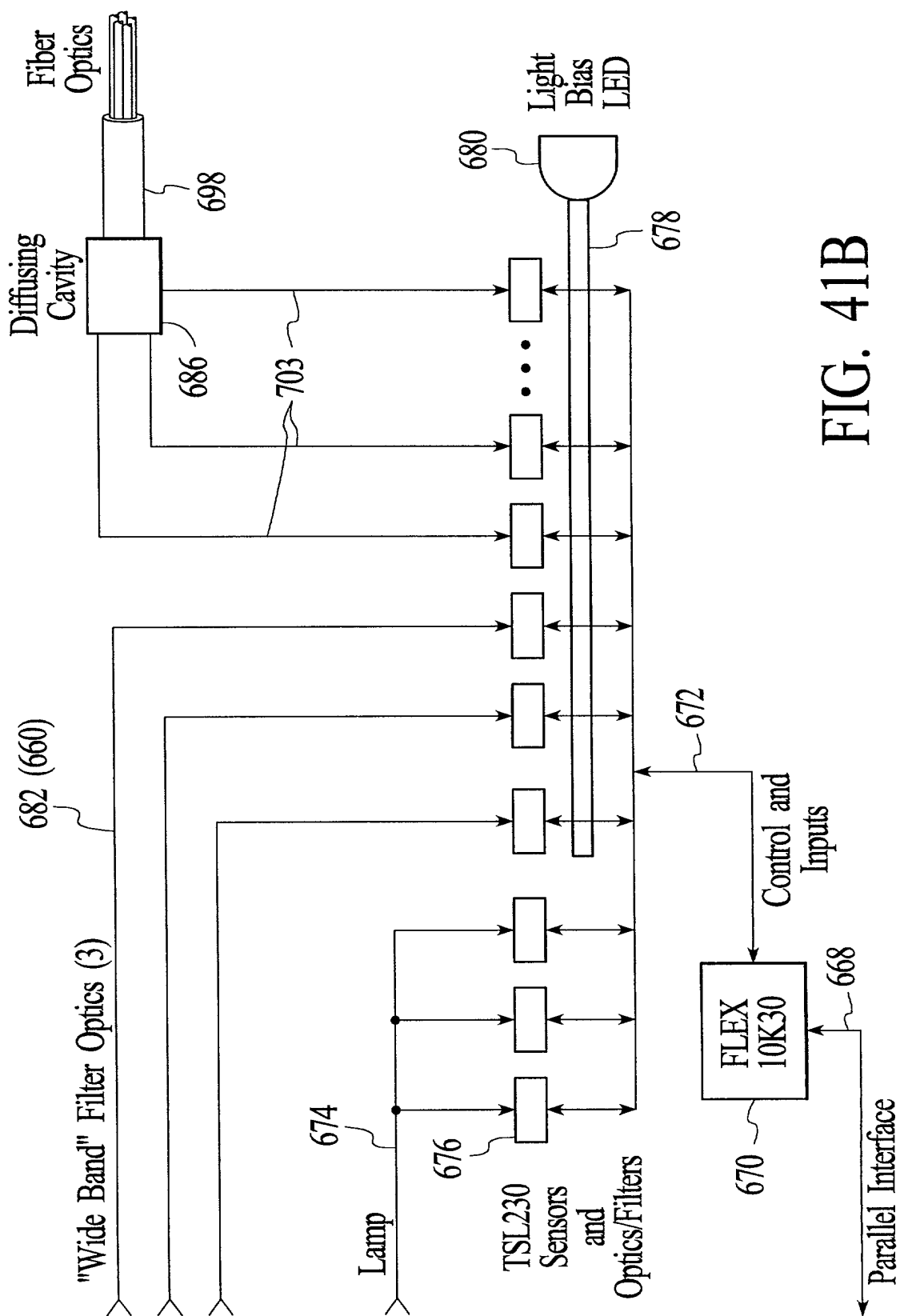


FIG. 41B

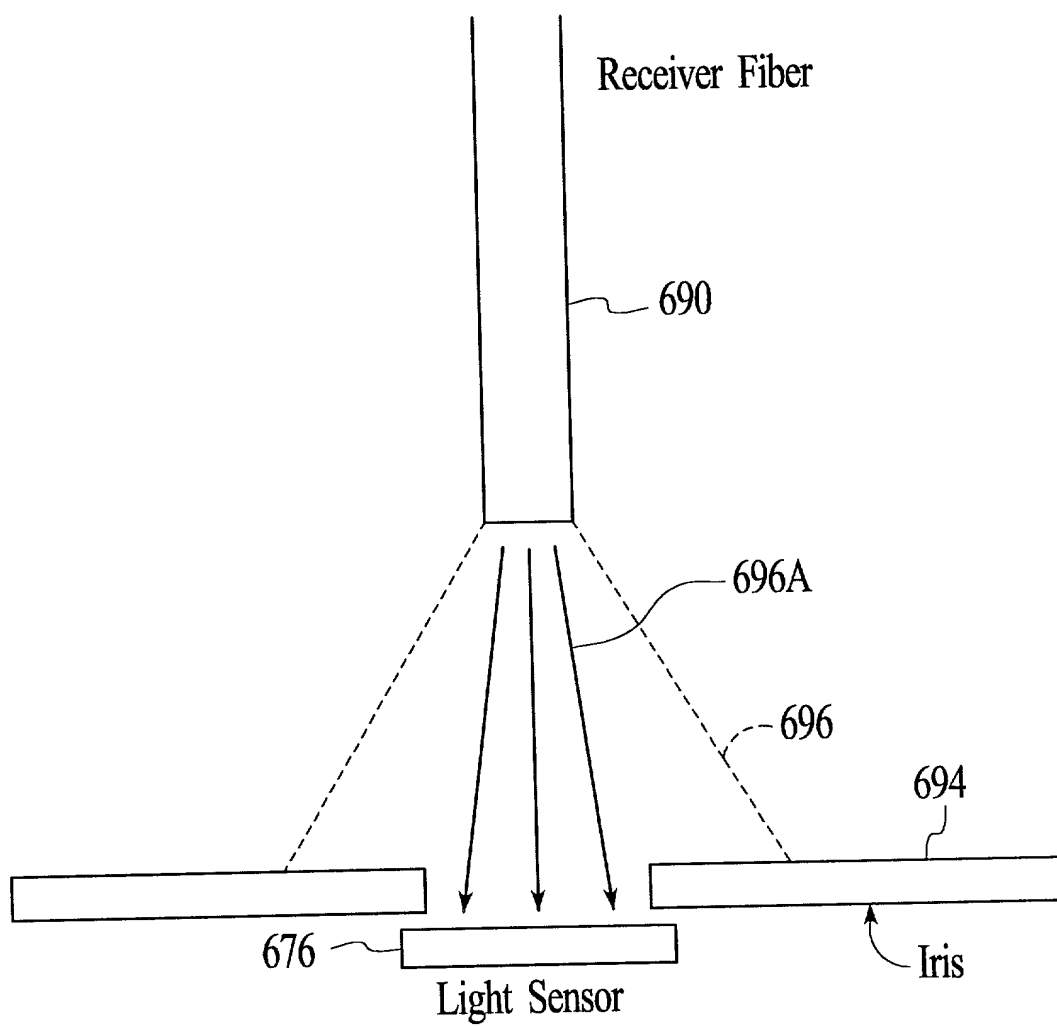


FIG. 42

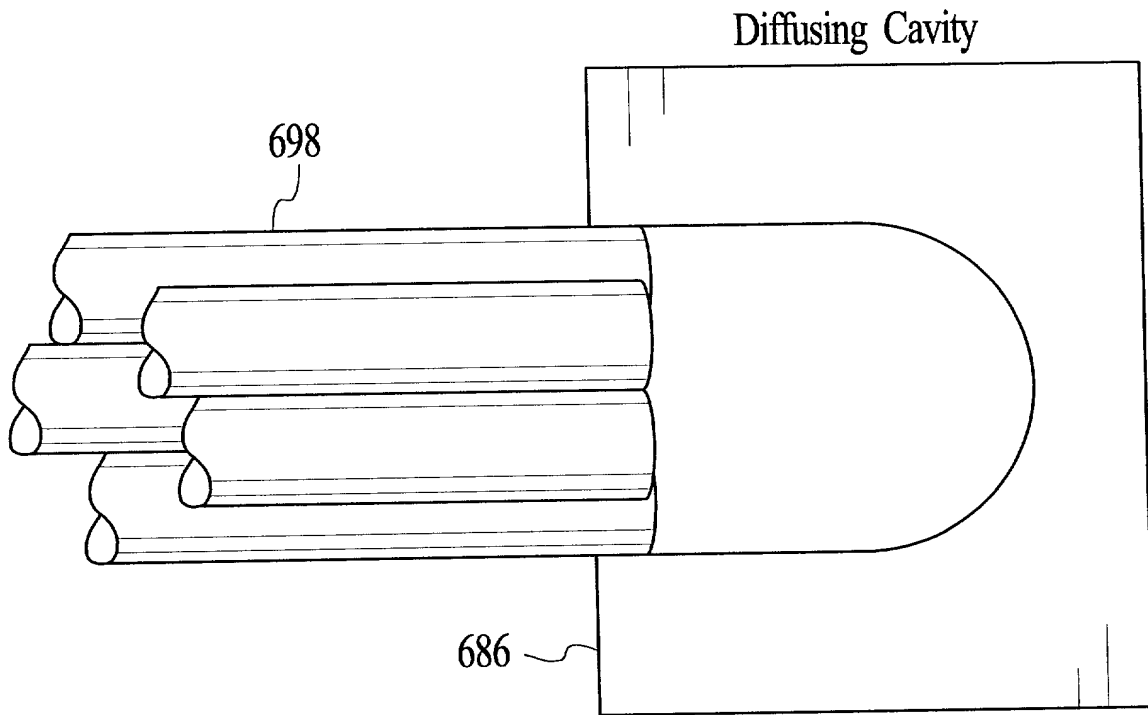


FIG. 43A

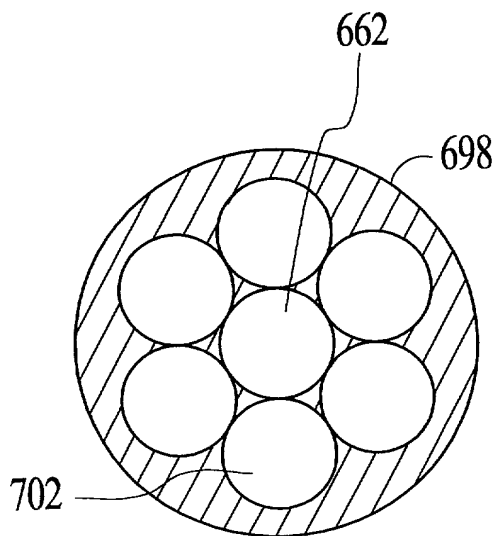


FIG. 43B

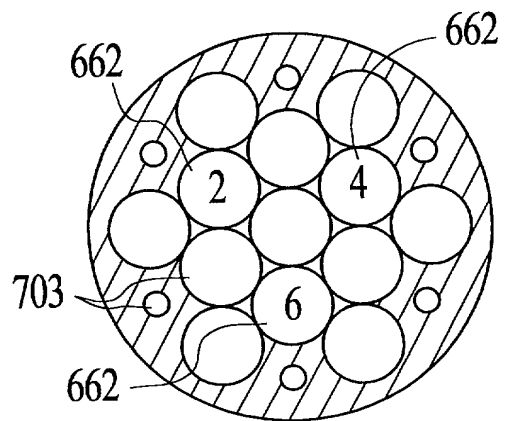


FIG. 43C

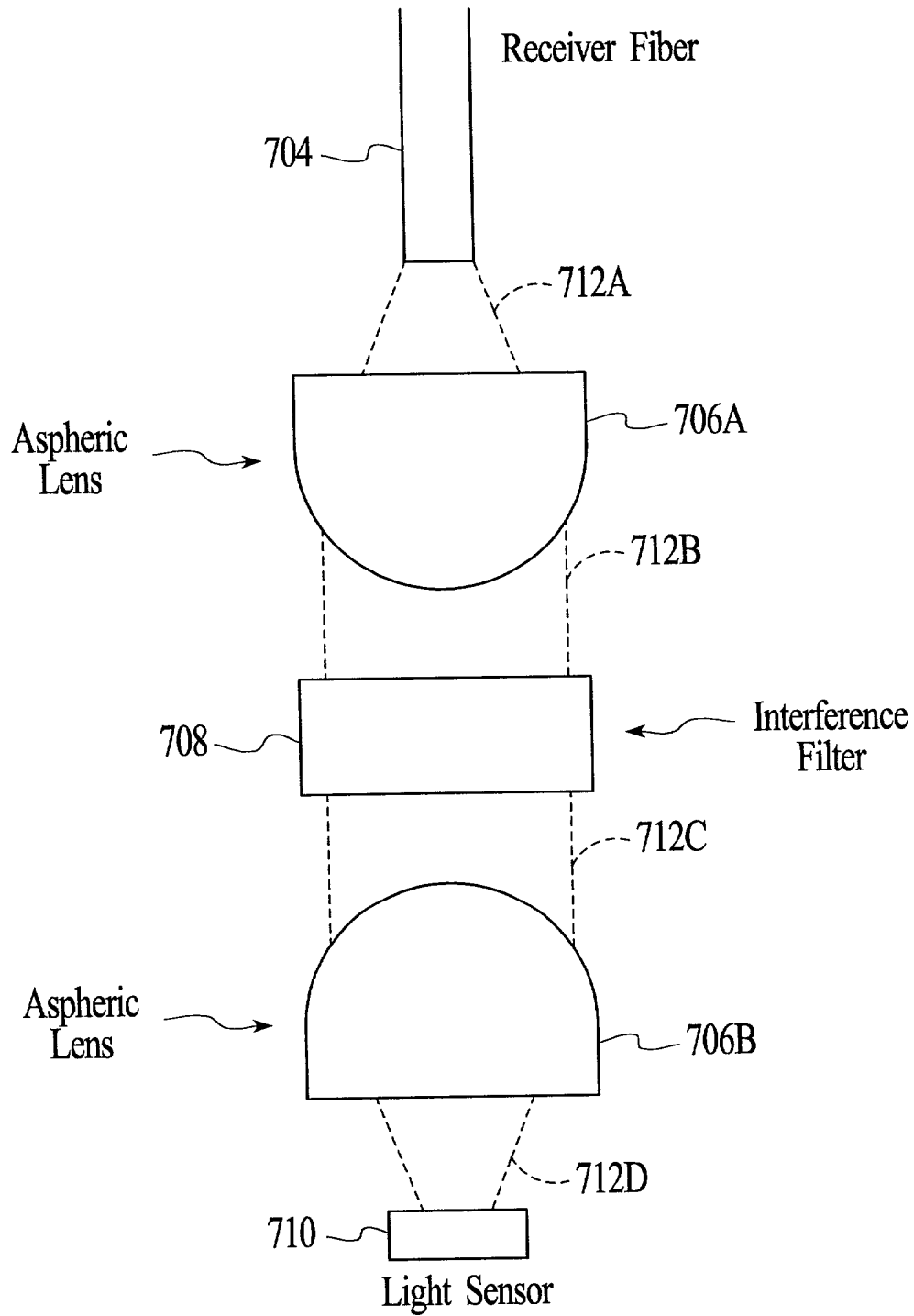


FIG. 44

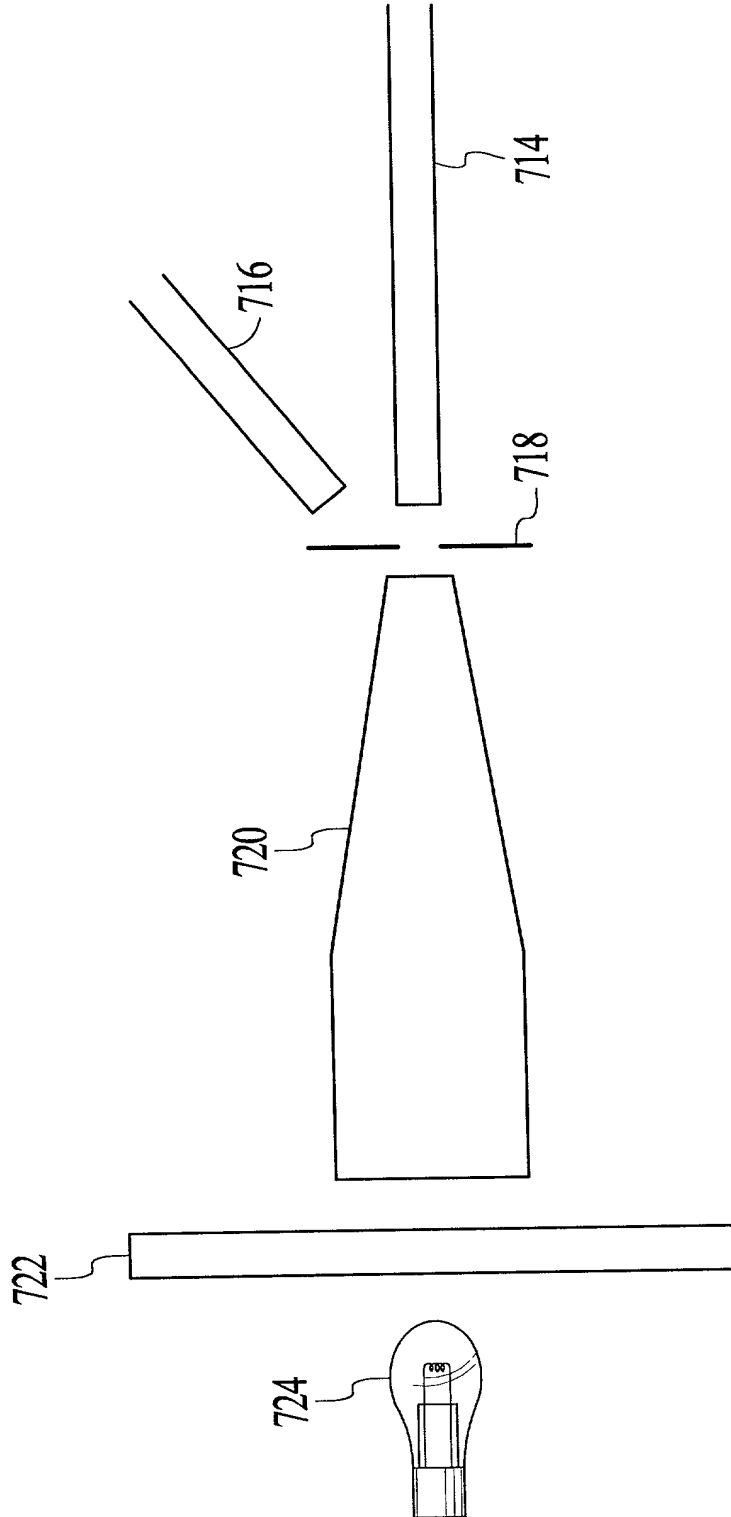


FIG. 45

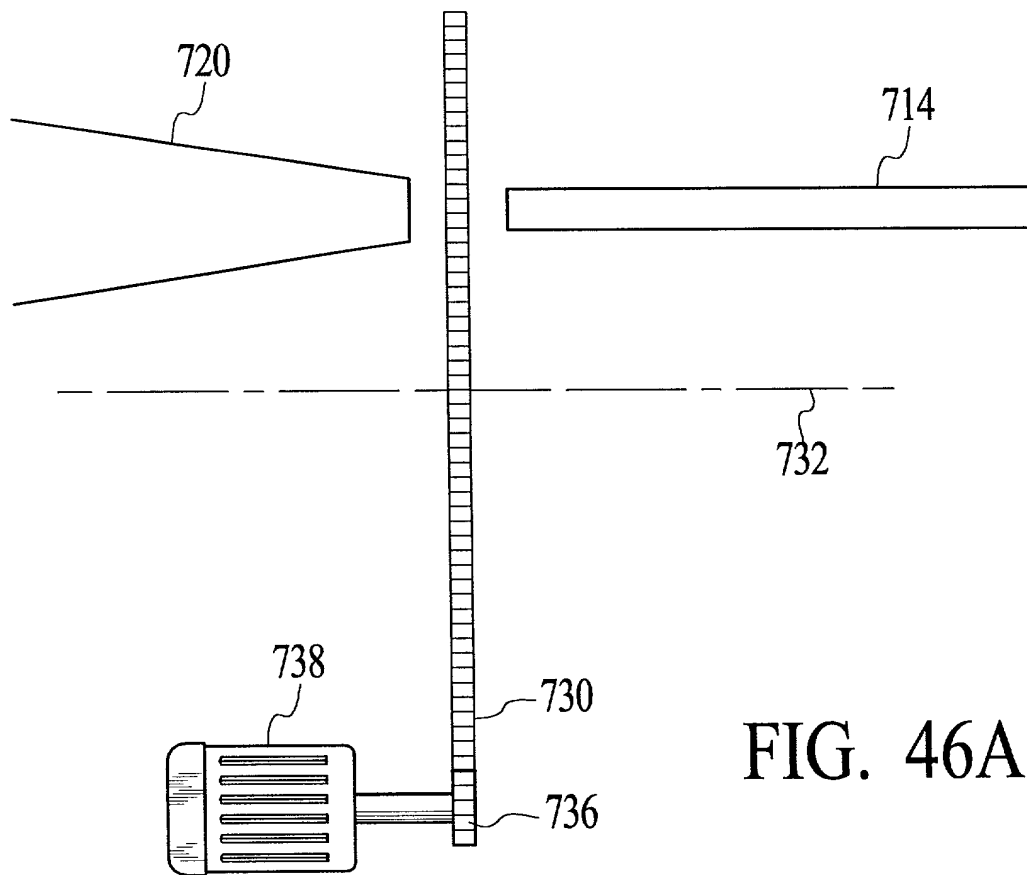


FIG. 46A

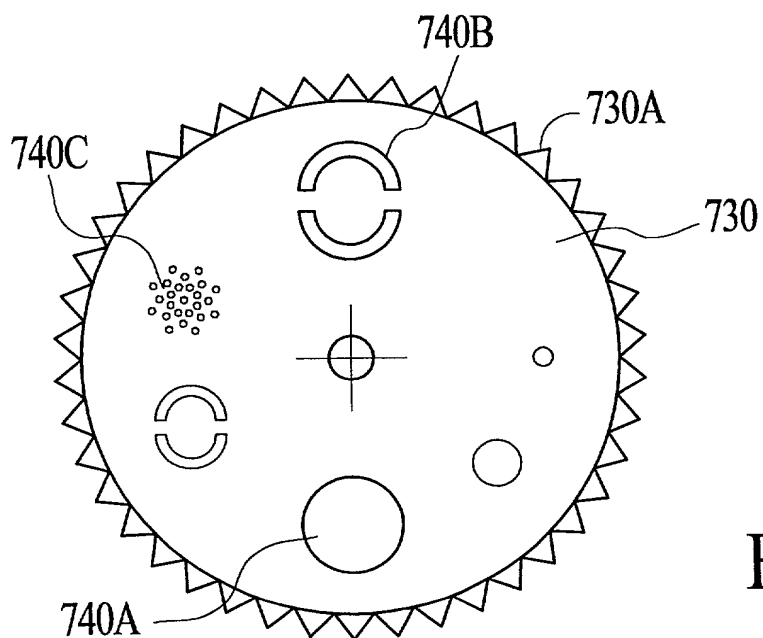
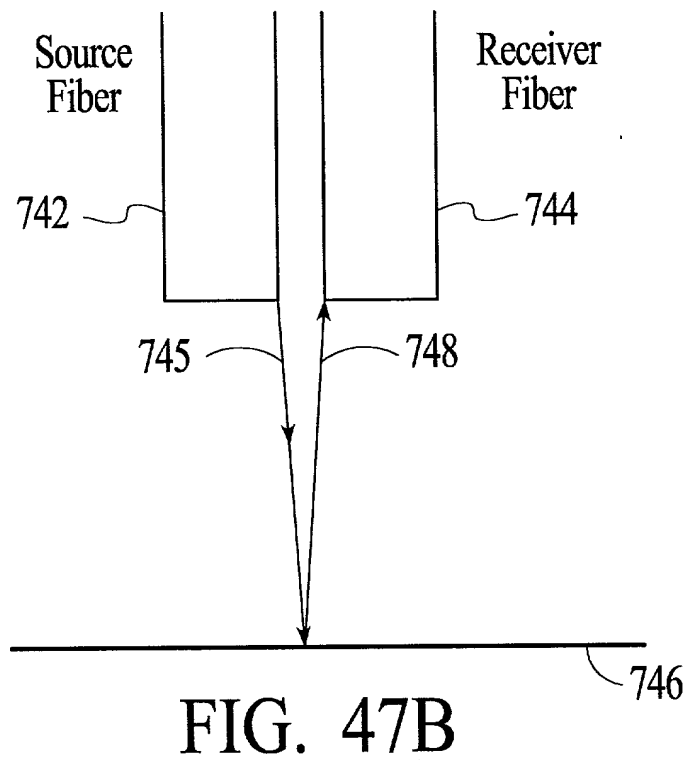
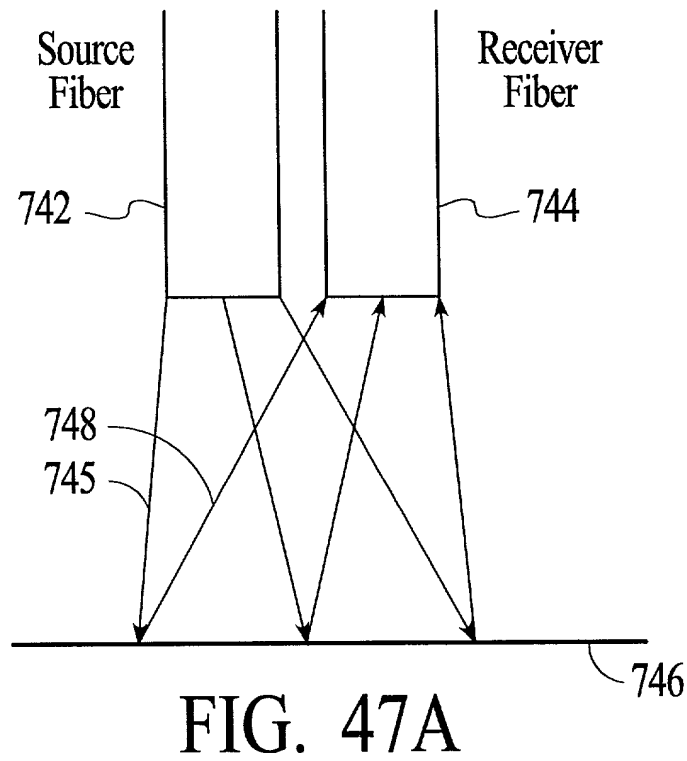


FIG. 46B



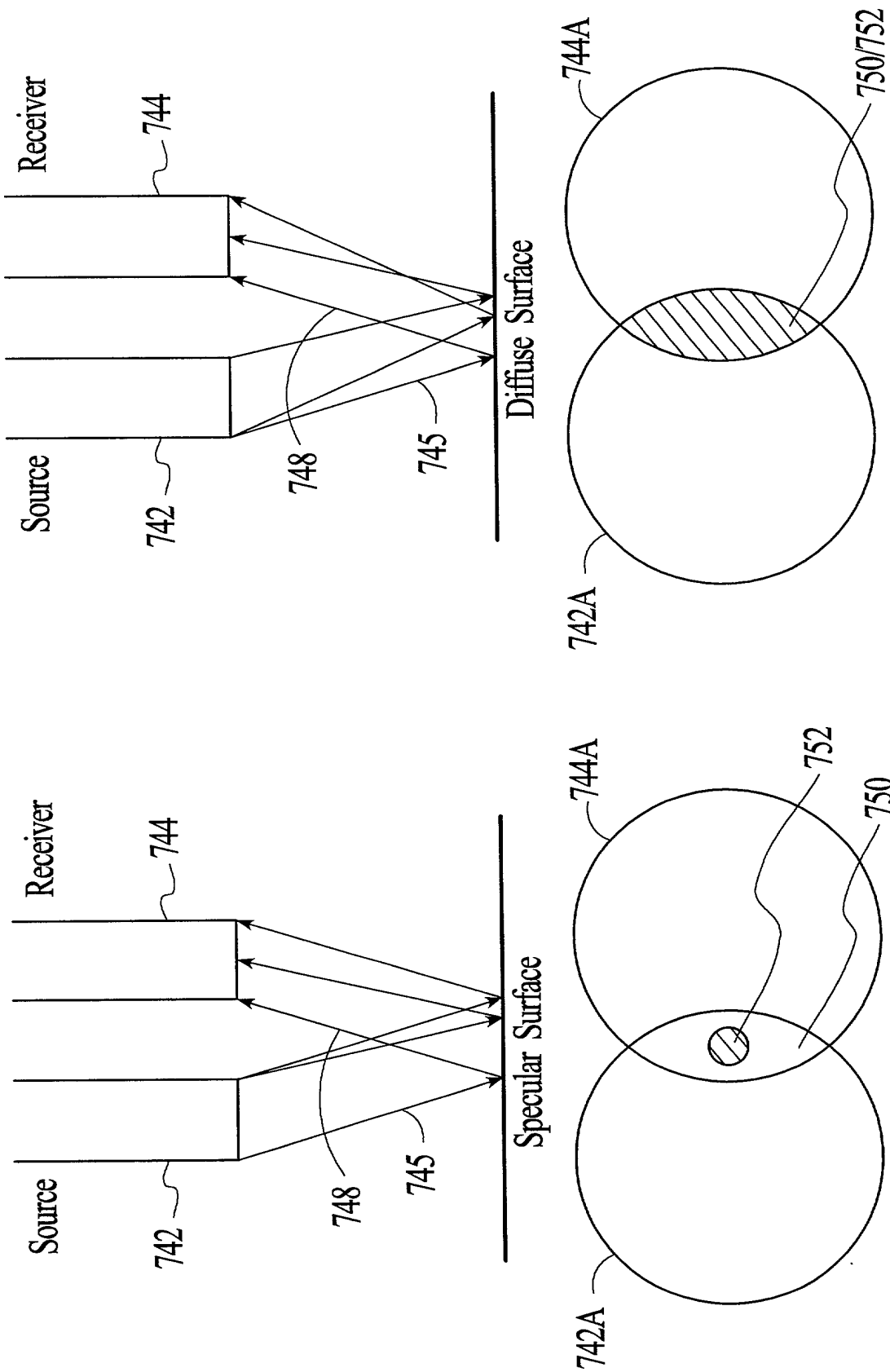


FIG. 48B

FIG. 48A

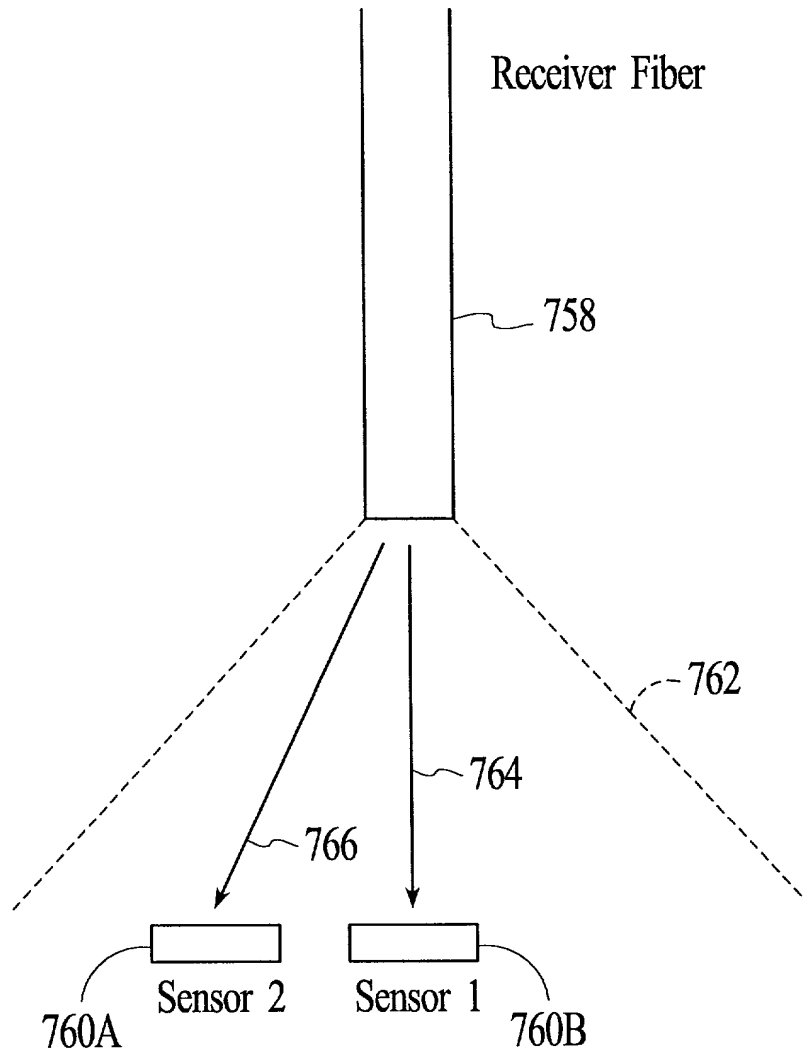


FIG. 49

INTENSITY SPECULAR

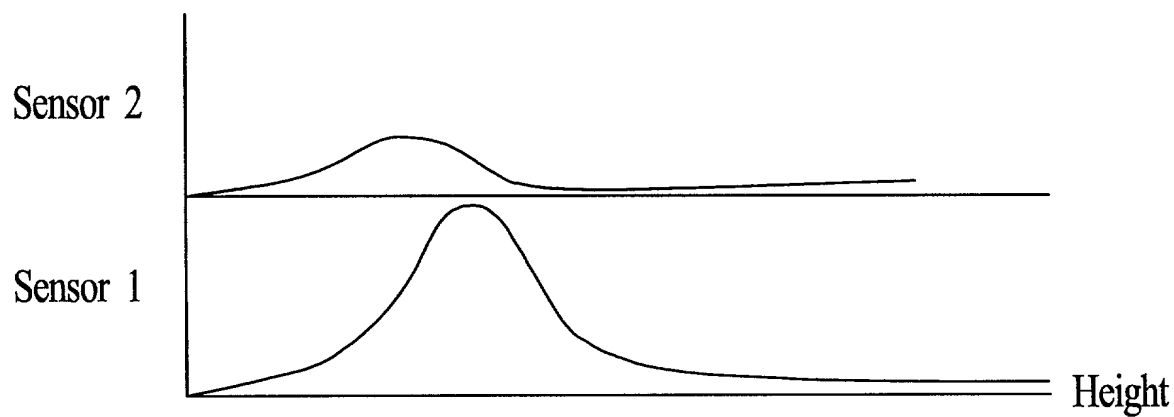


FIG. 50A

INTENSITY DIFFUSE

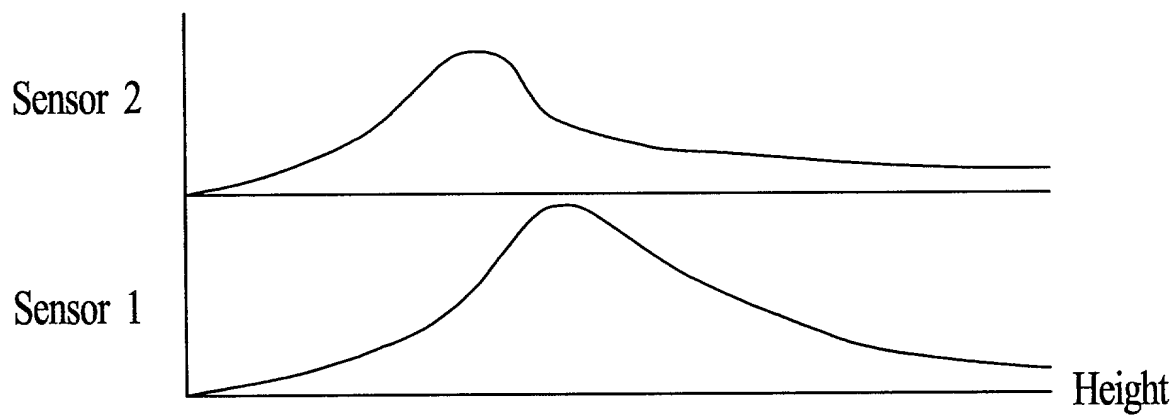
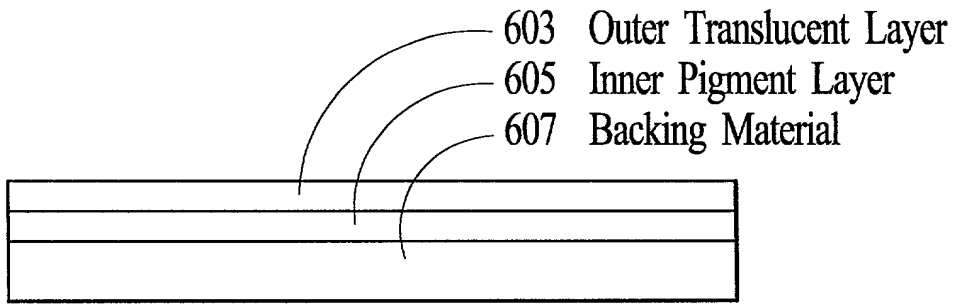


FIG. 50B



601

FIG. 51A

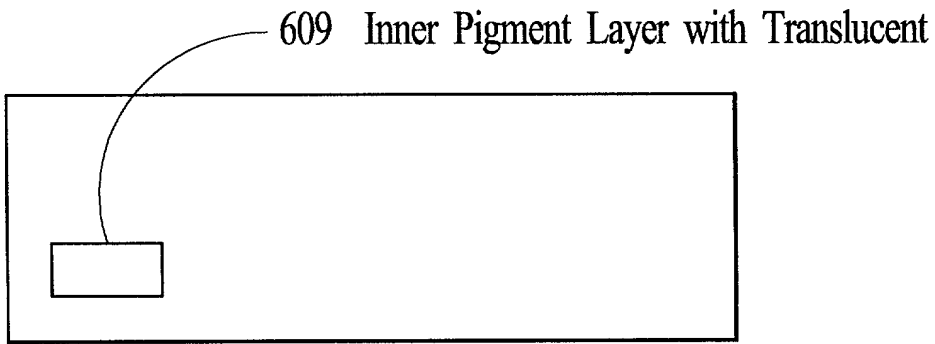
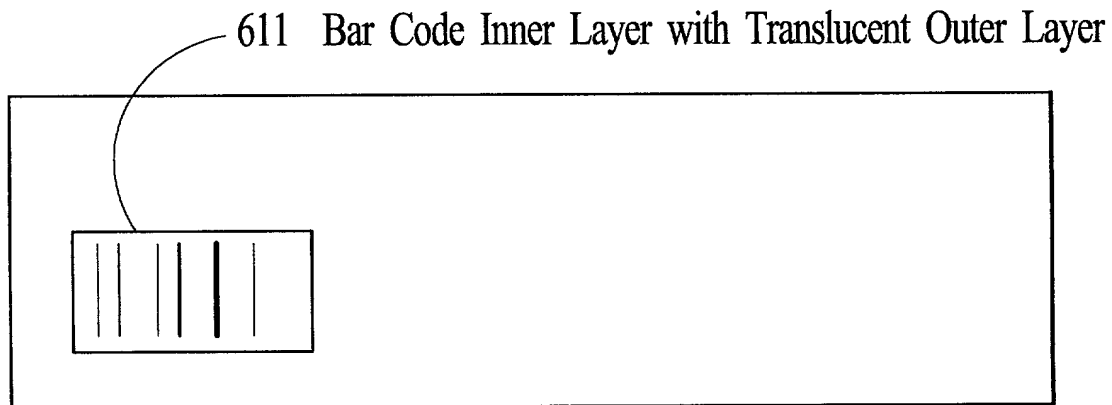


FIG. 51B



601

FIG. 51C

204010 50265001

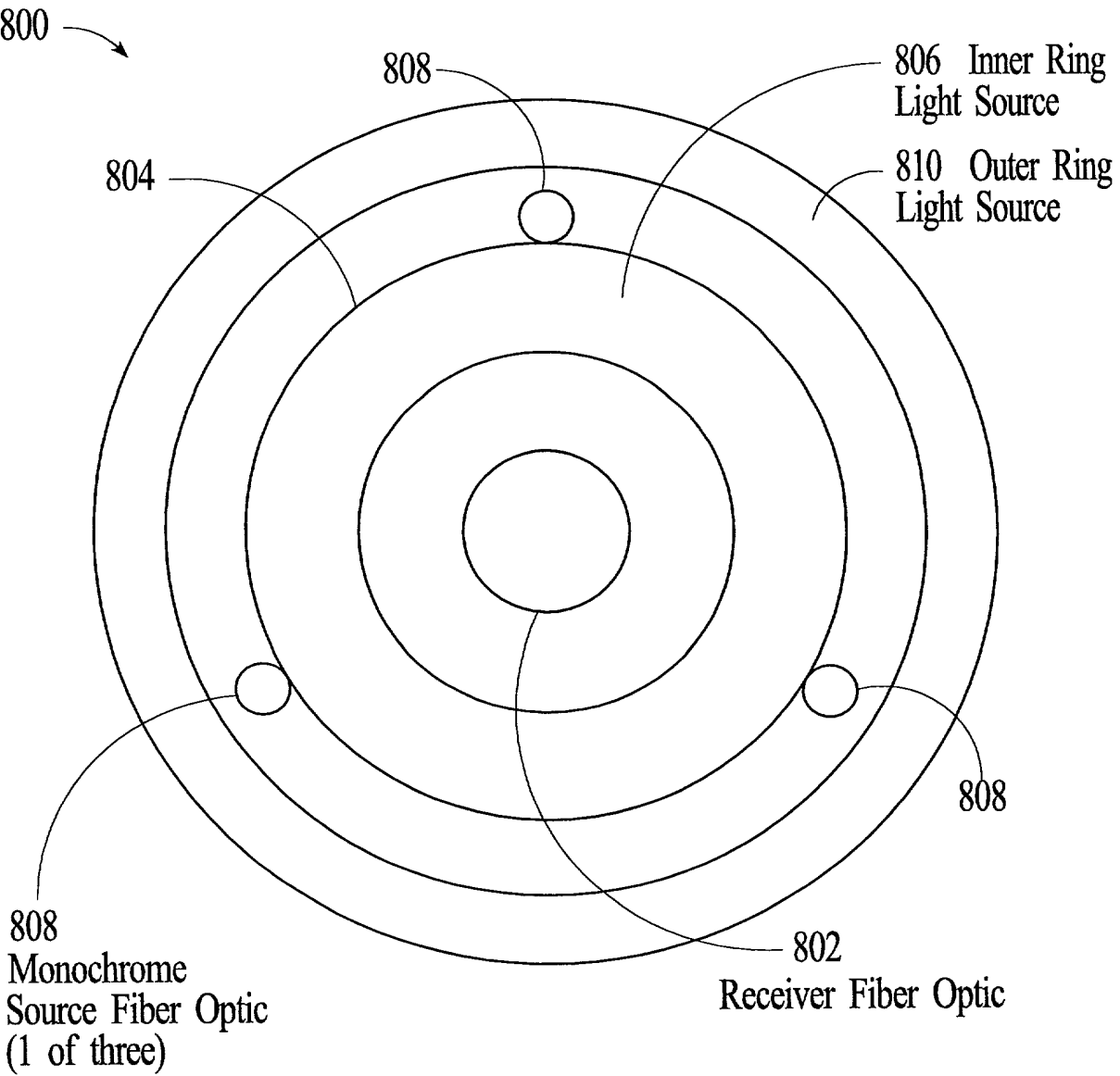


FIG. 52

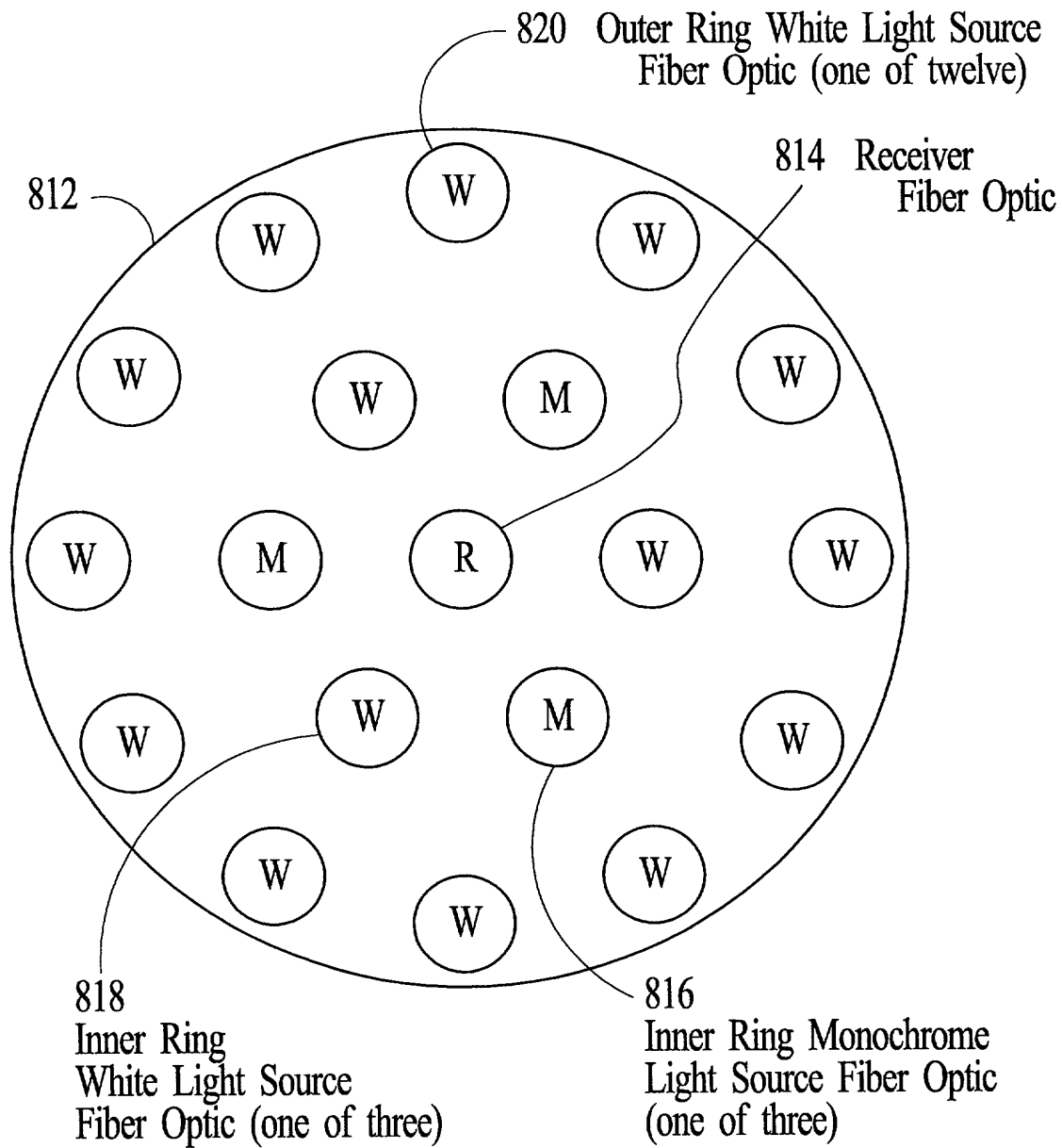


FIG. 53

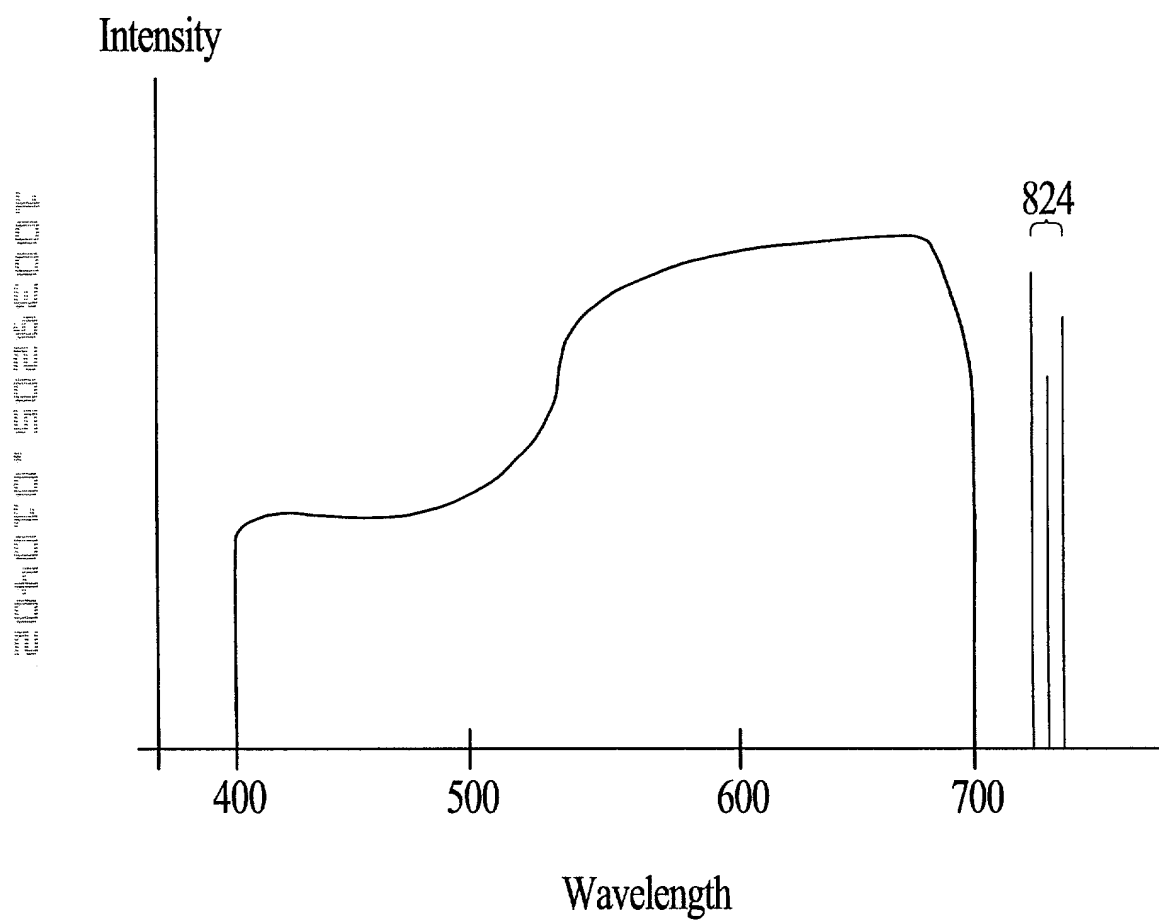


FIG. 54

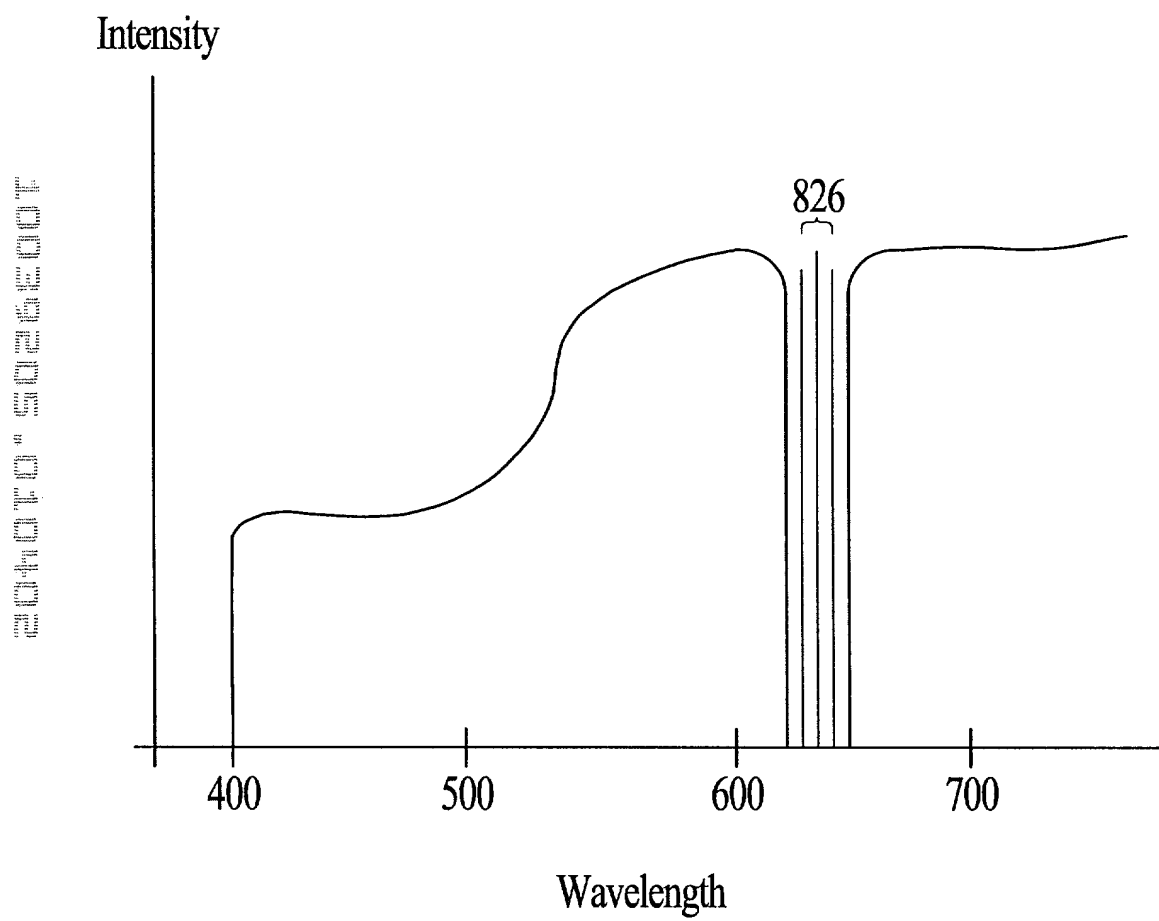
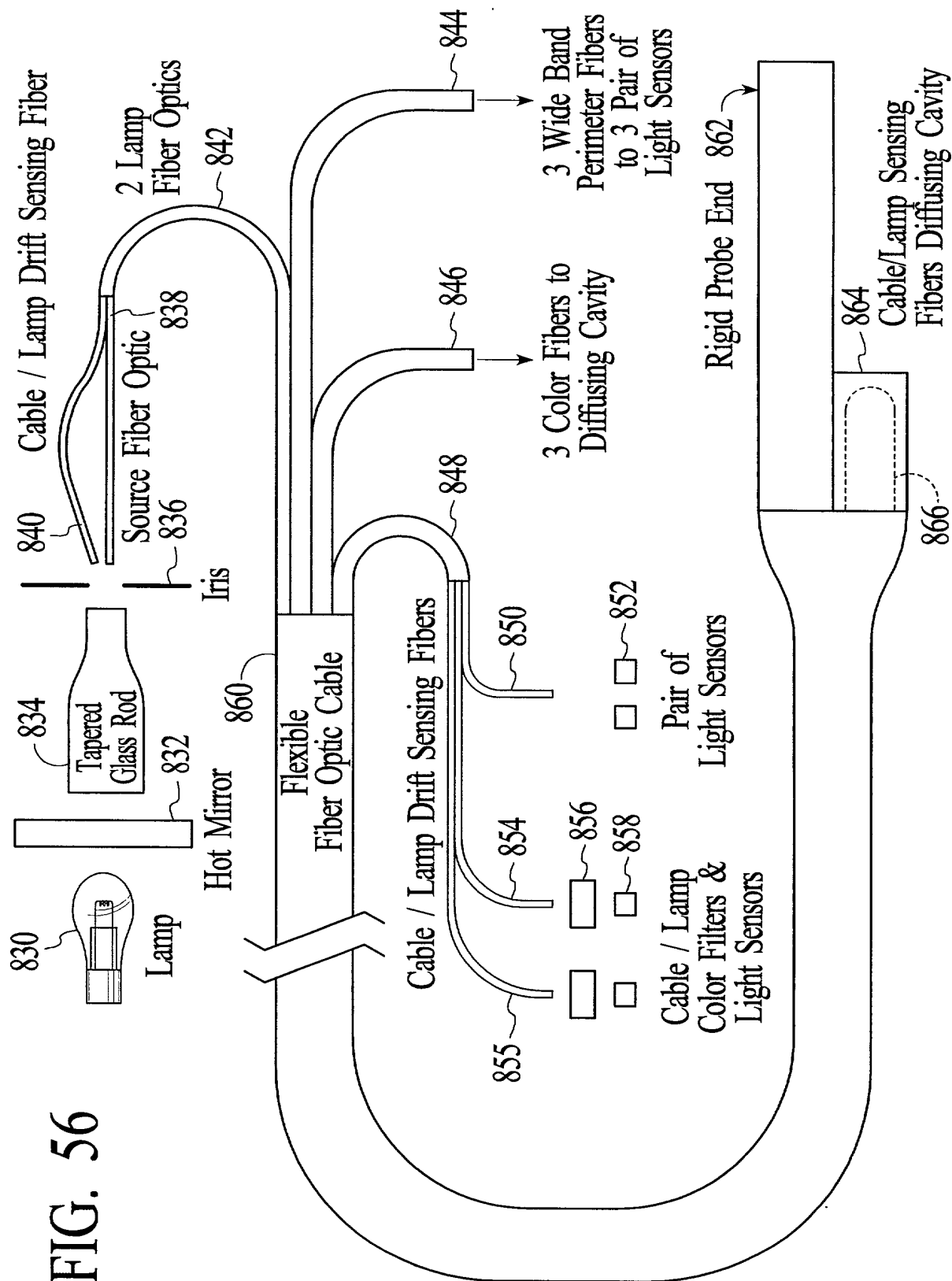


FIG. 55



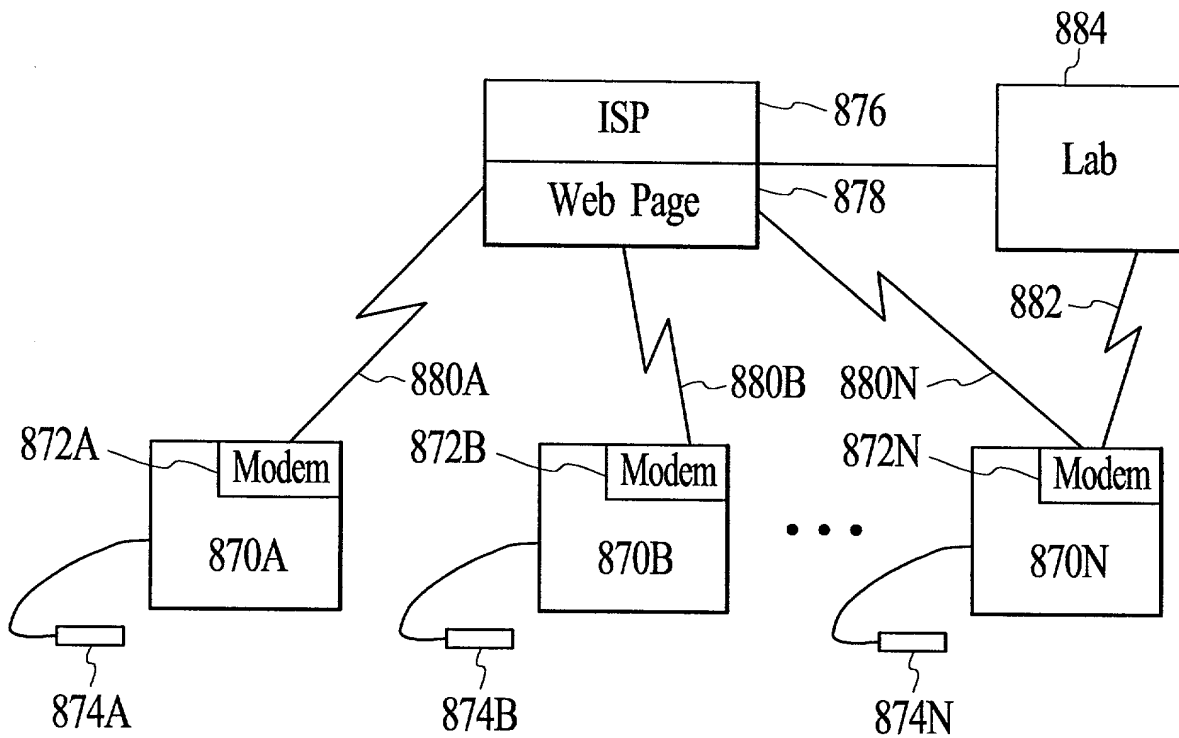


FIG. 57

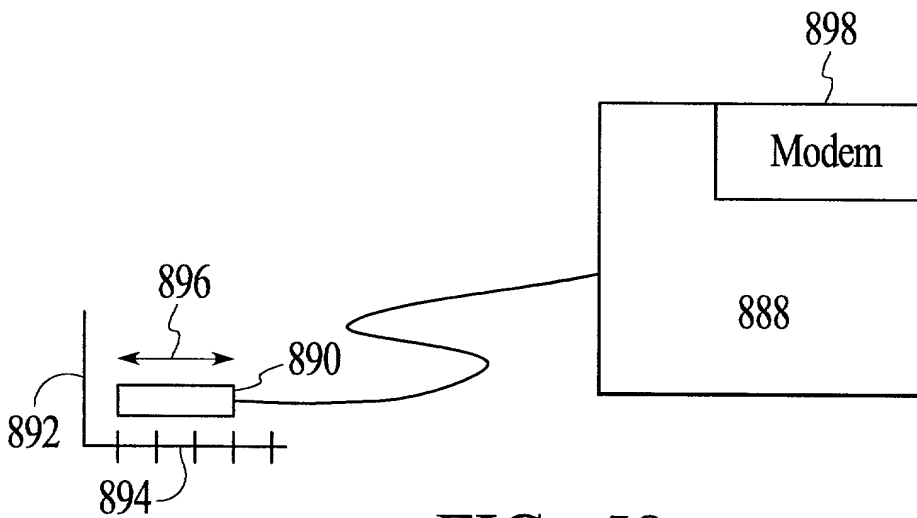


FIG. 58

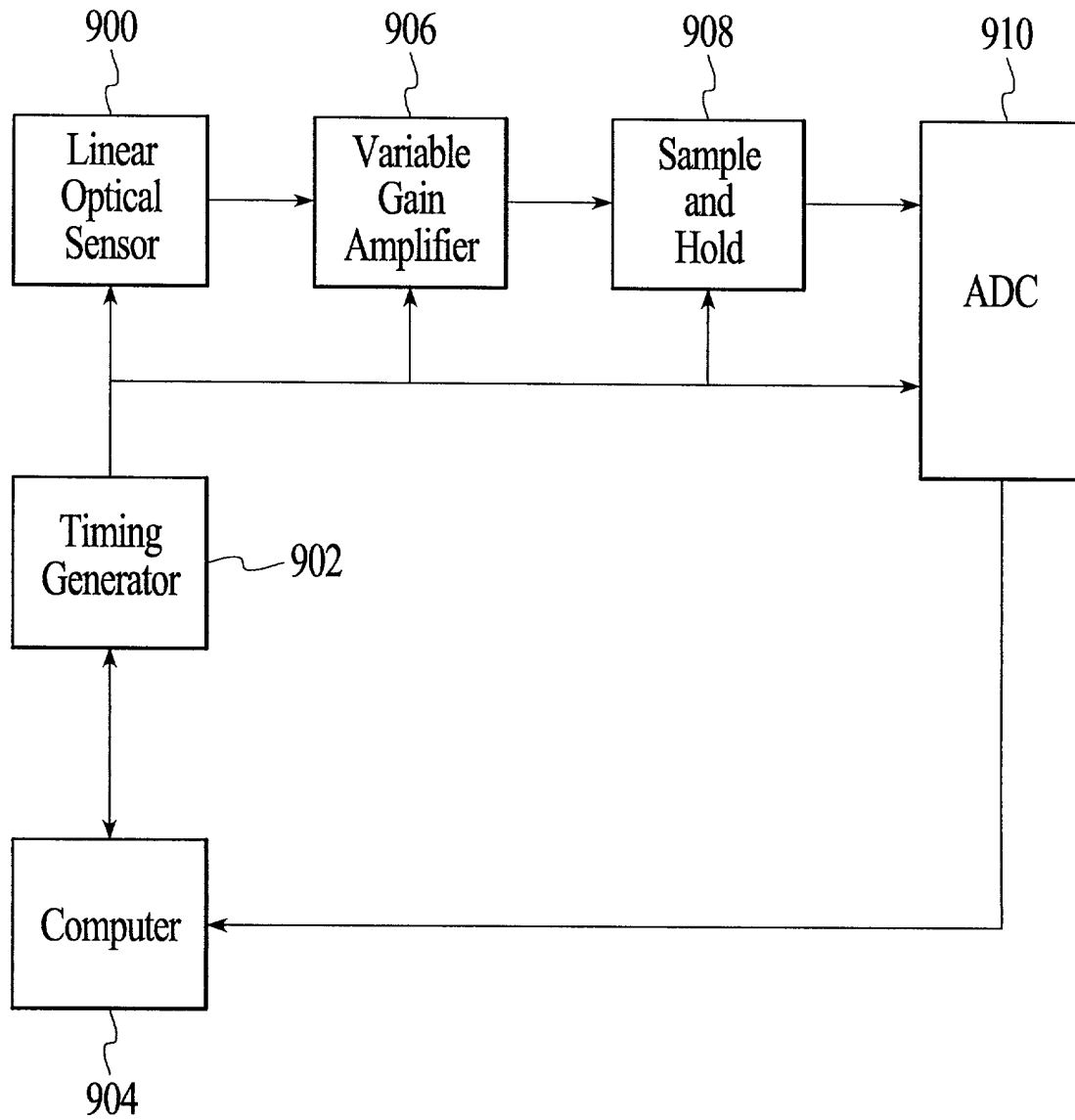


FIG. 59

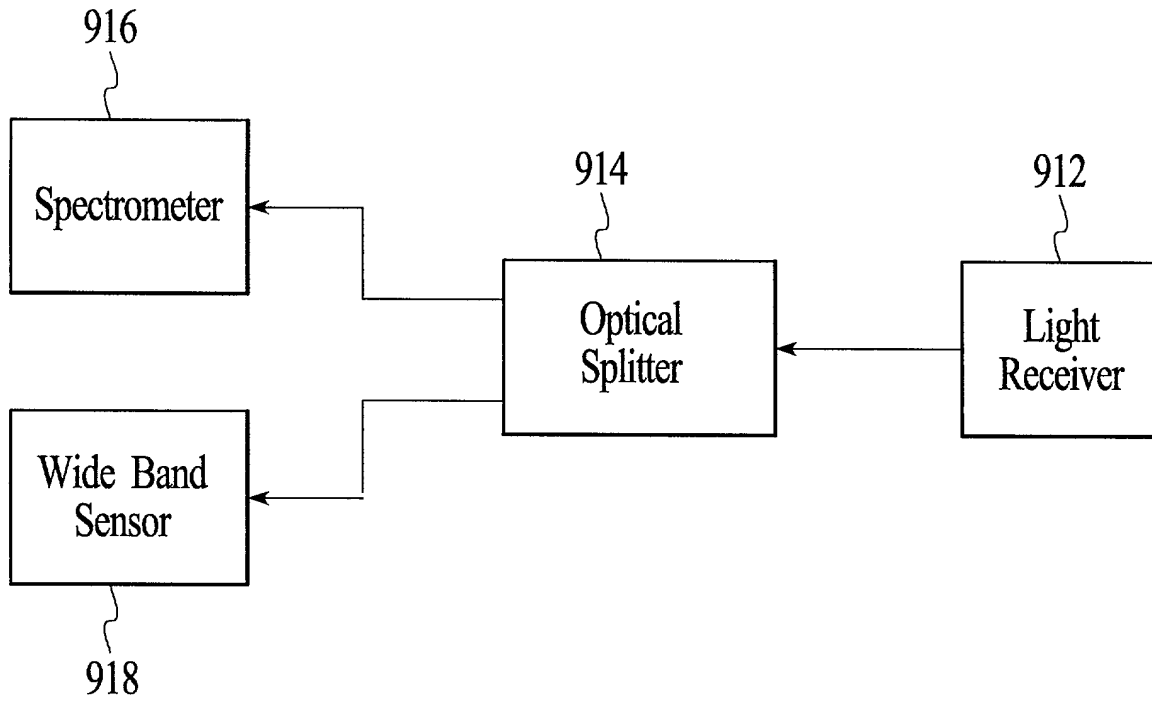


FIG. 60

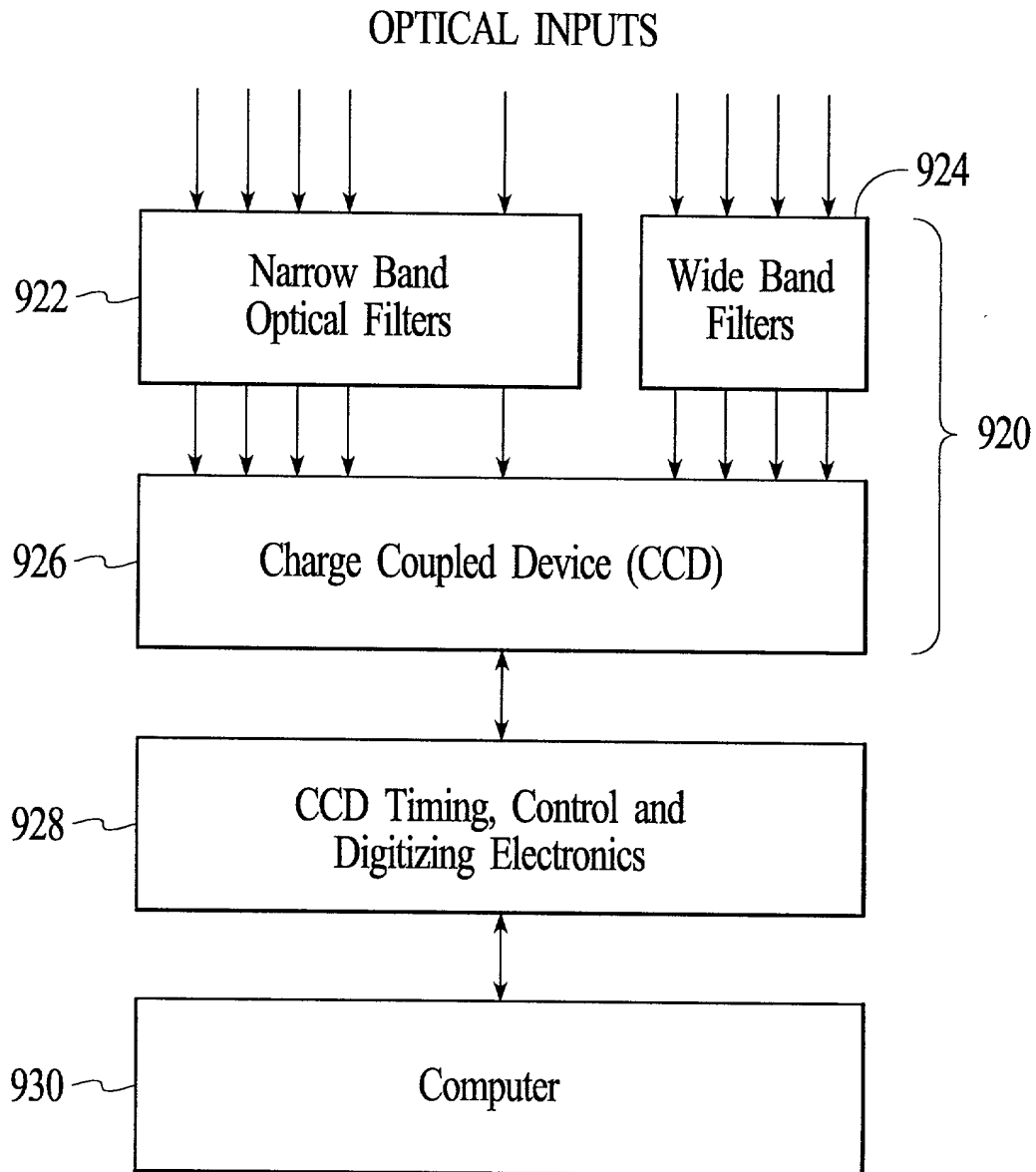


FIG. 61

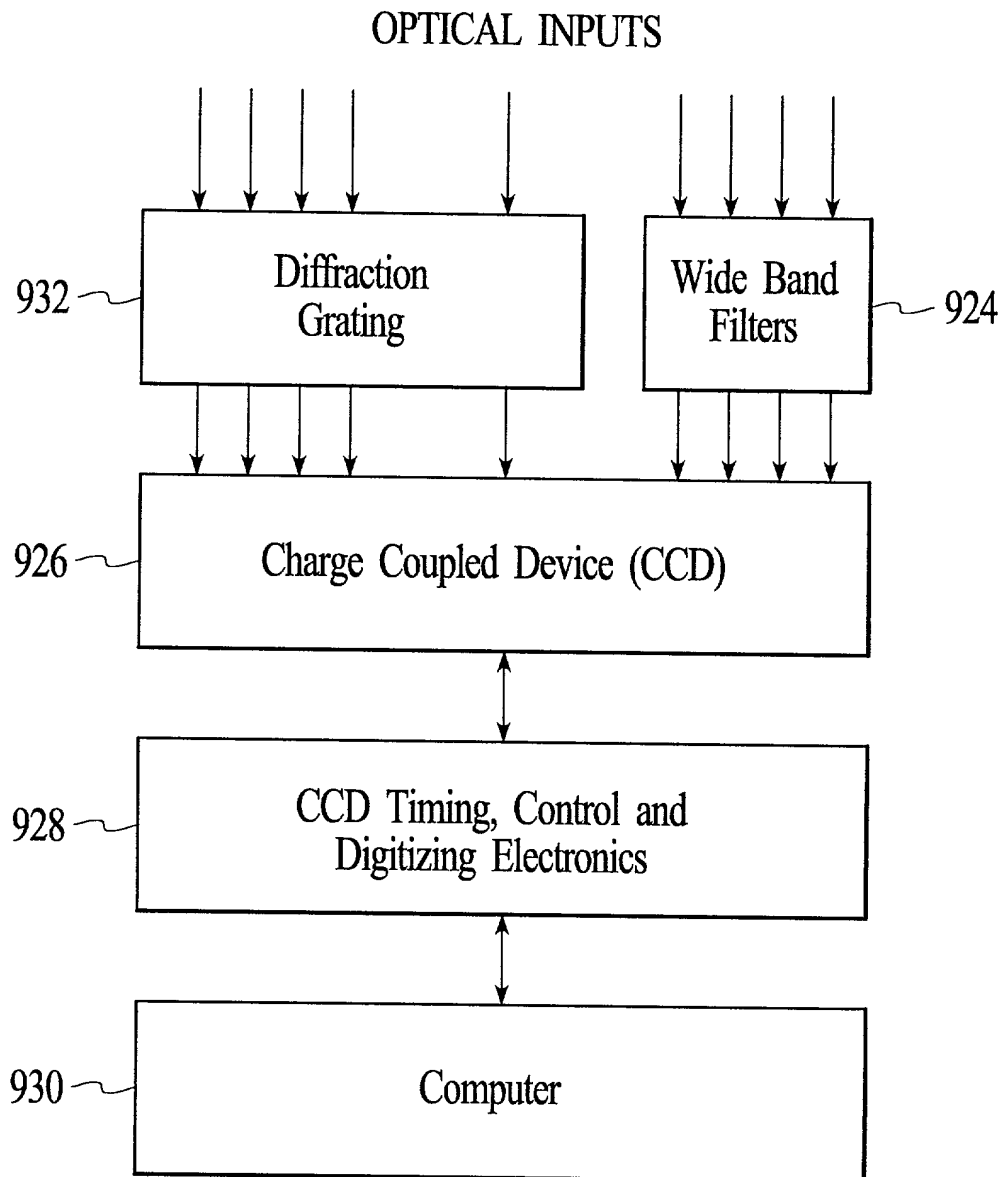


FIG. 62

FIG. 64

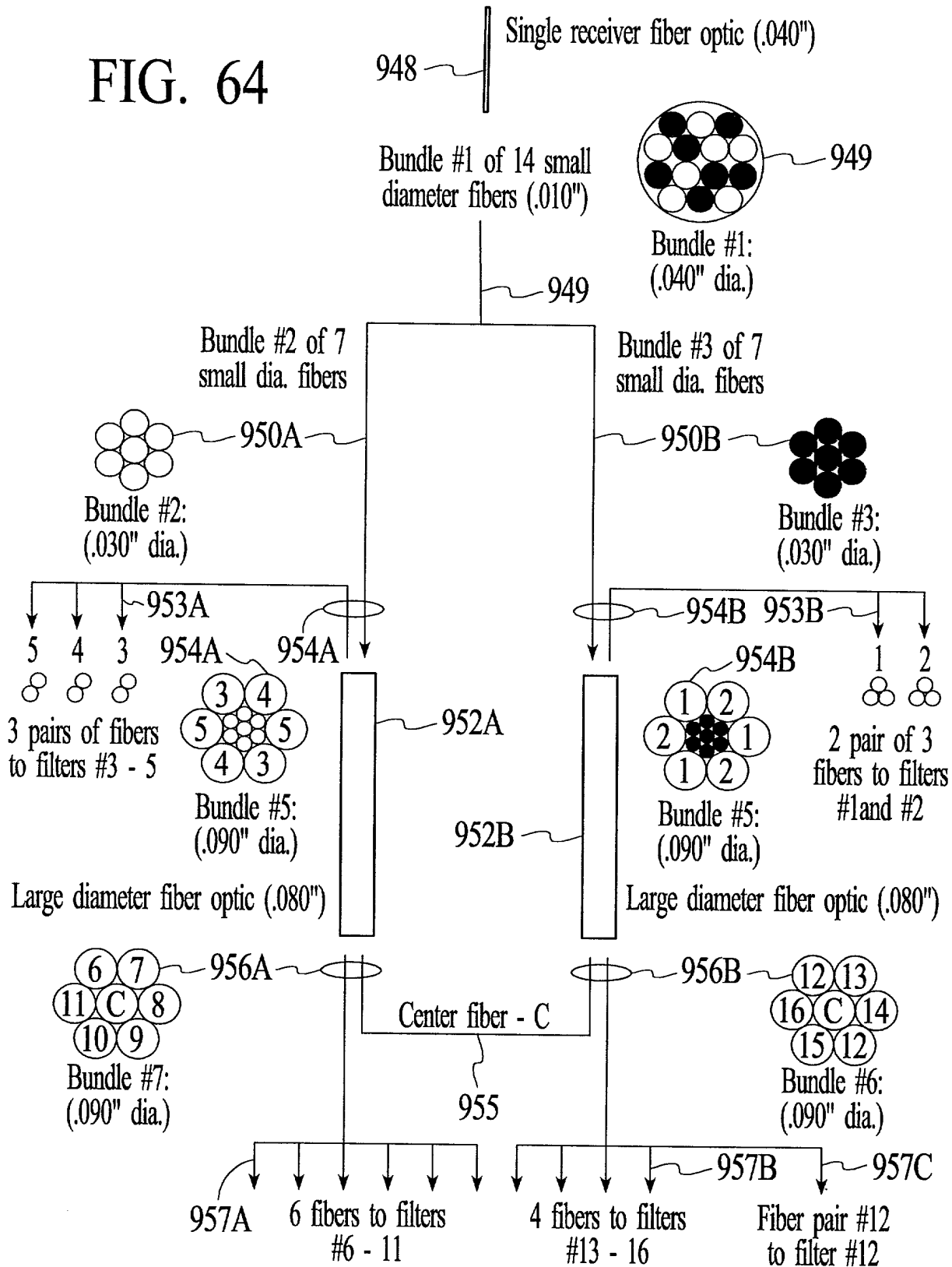
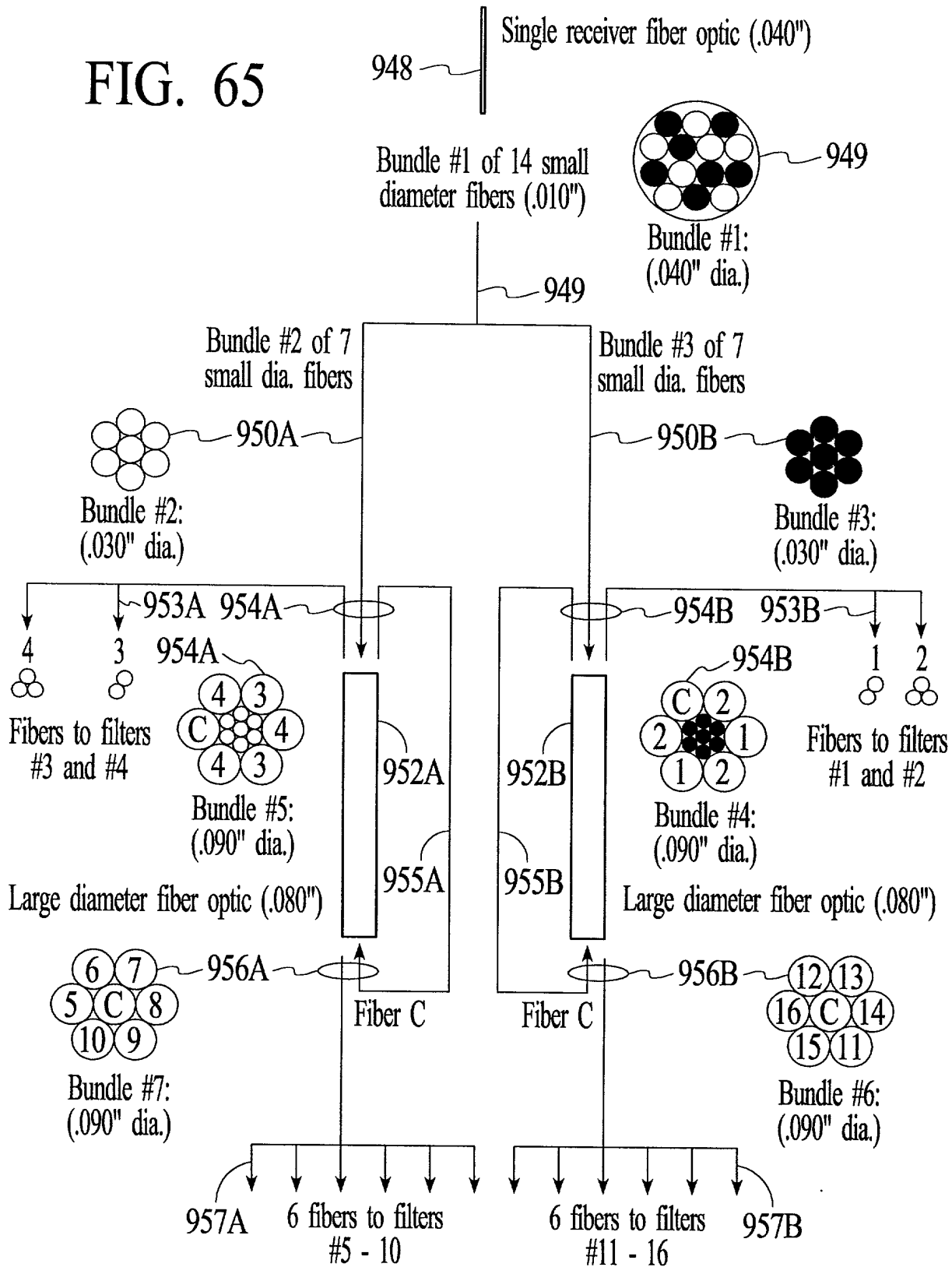


FIG. 65



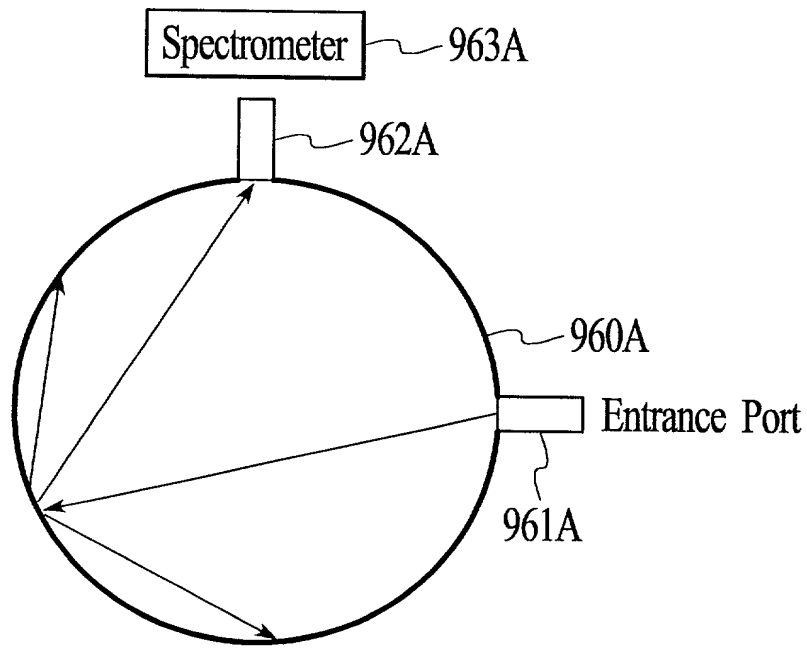


FIG. 66A

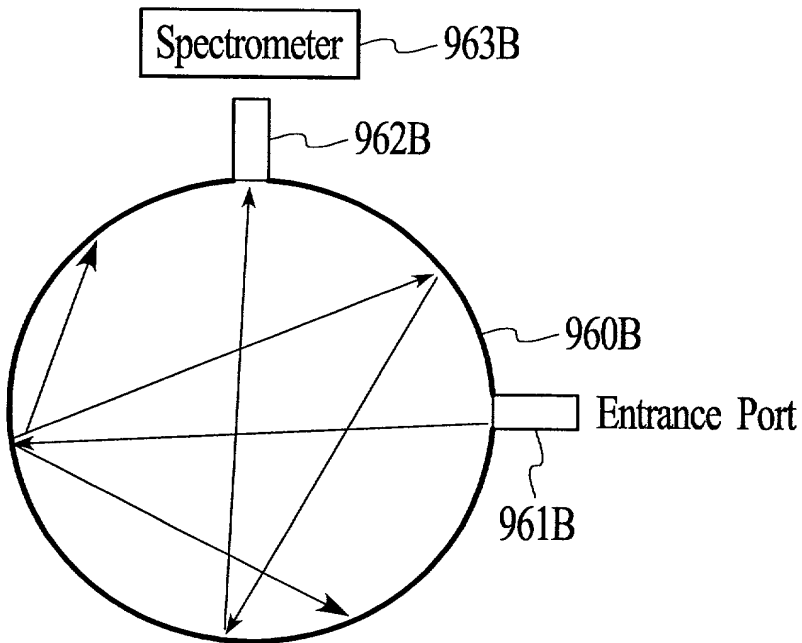


FIG. 66B

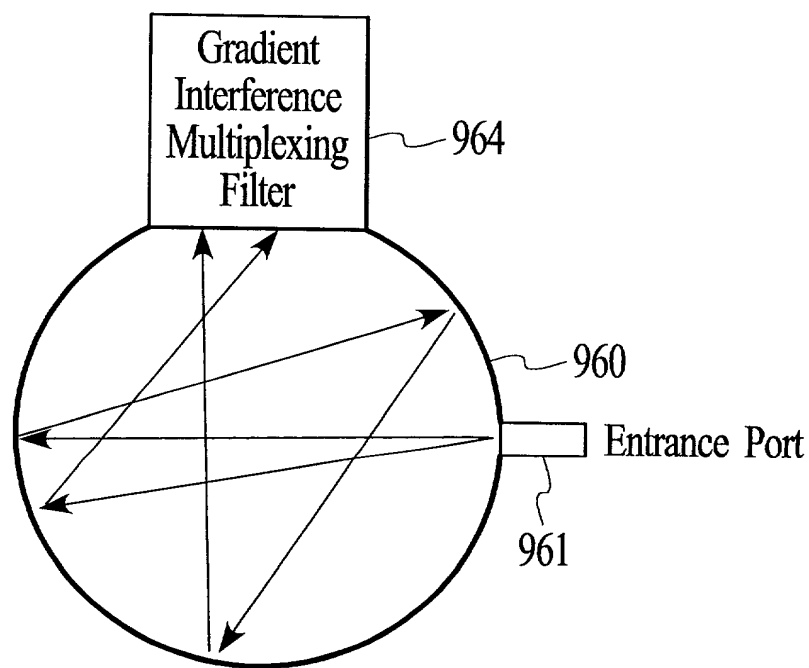


FIG. 67A

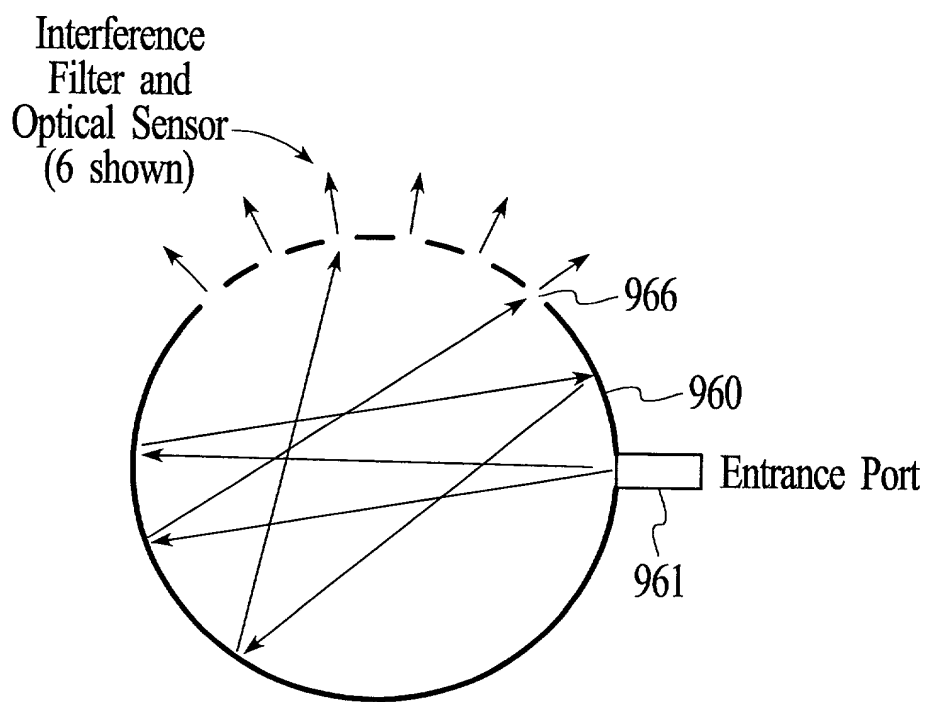


FIG. 67B

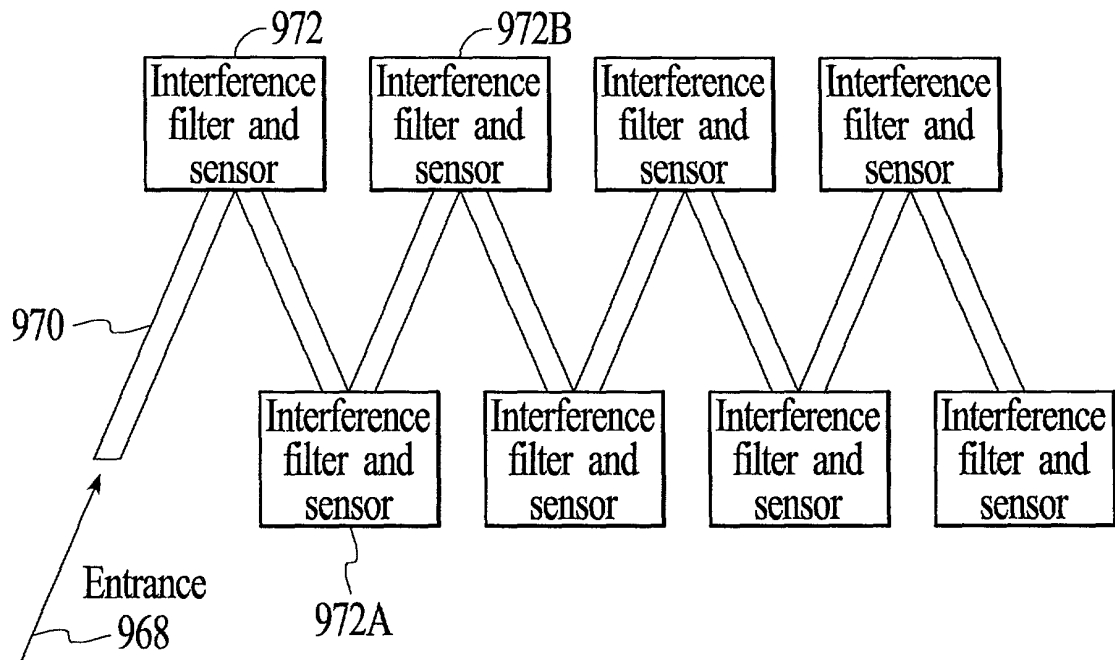


FIG. 68

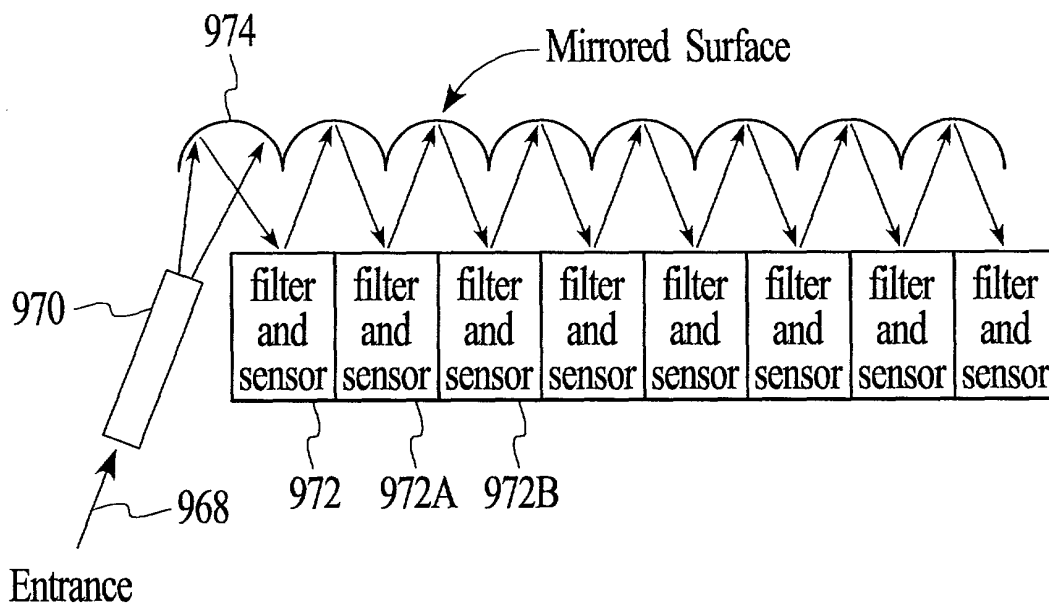


FIG. 69

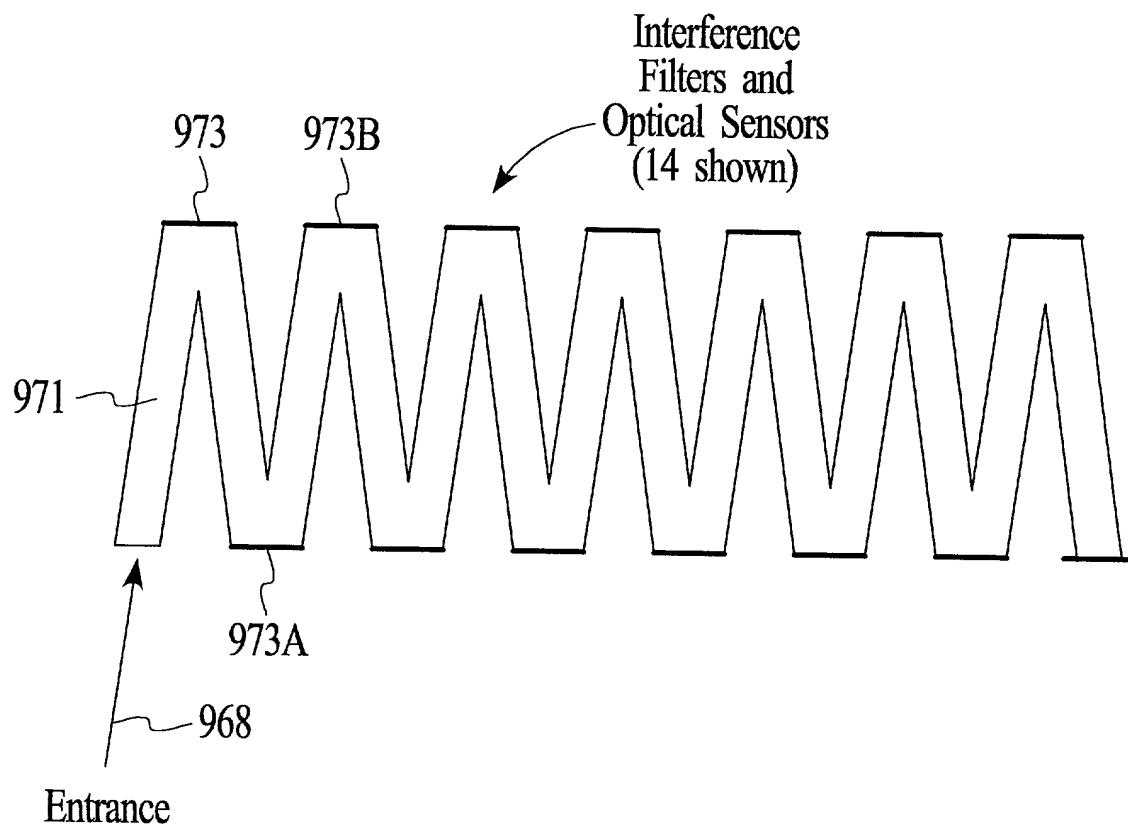
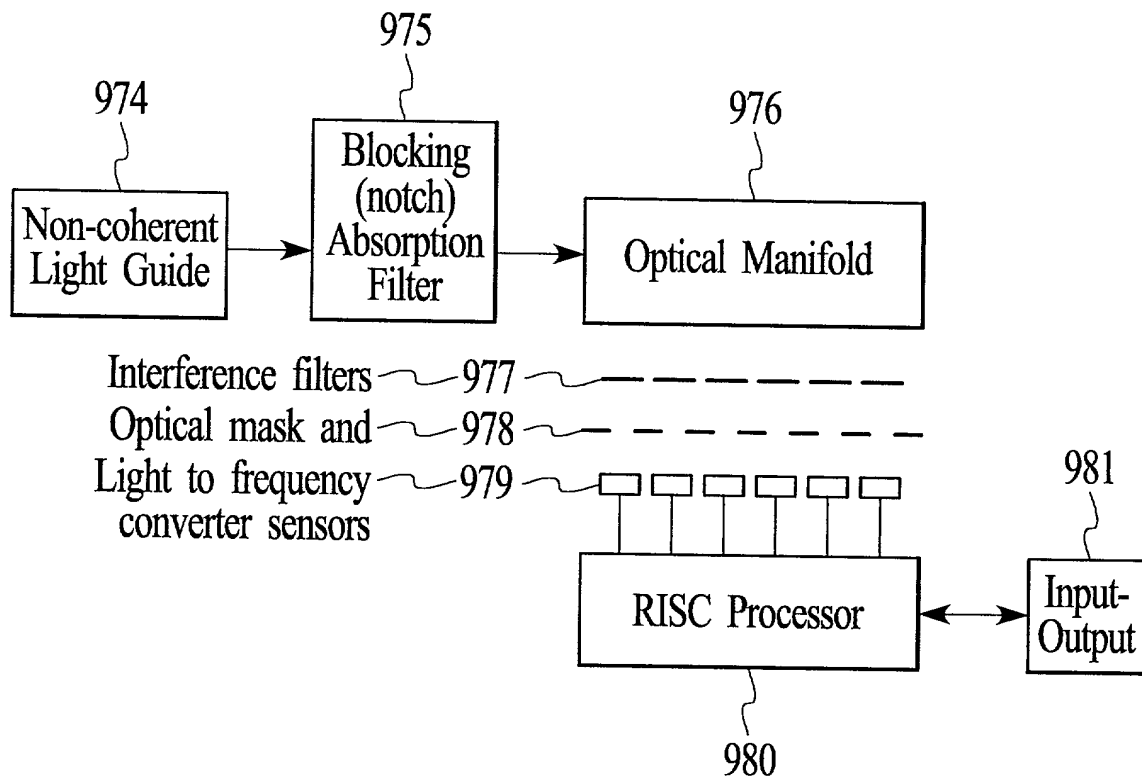
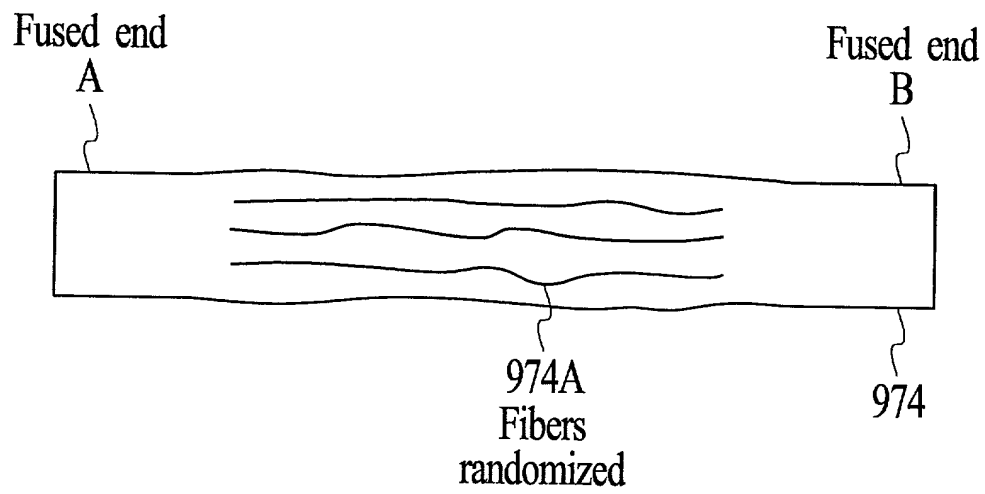


FIG. 70



Block Diagram

FIG. 71



Non-Coherent Light Guide

FIG. 72

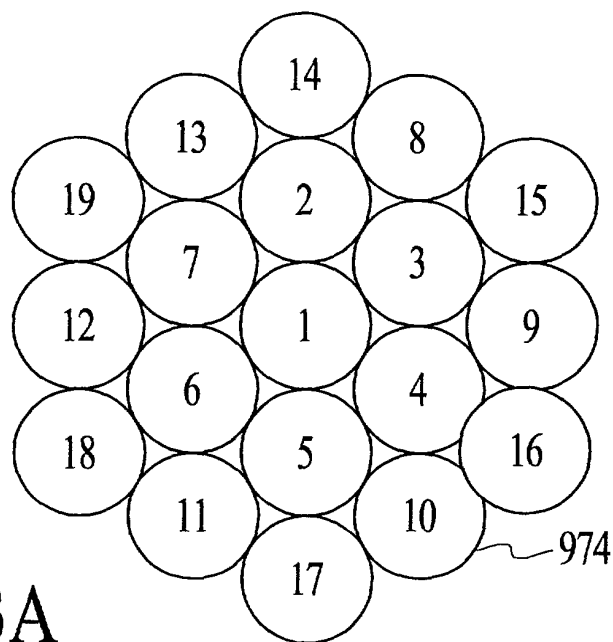


FIG. 73A

Non-Coherent Light Guide End View A

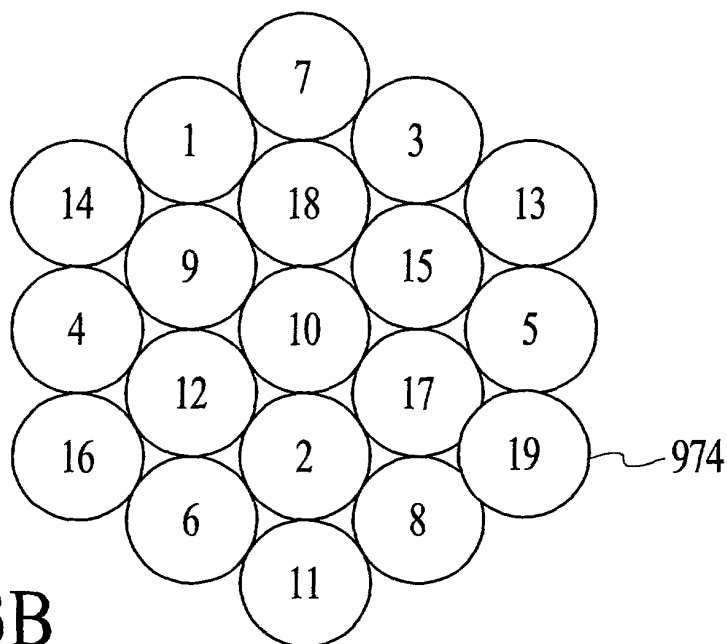
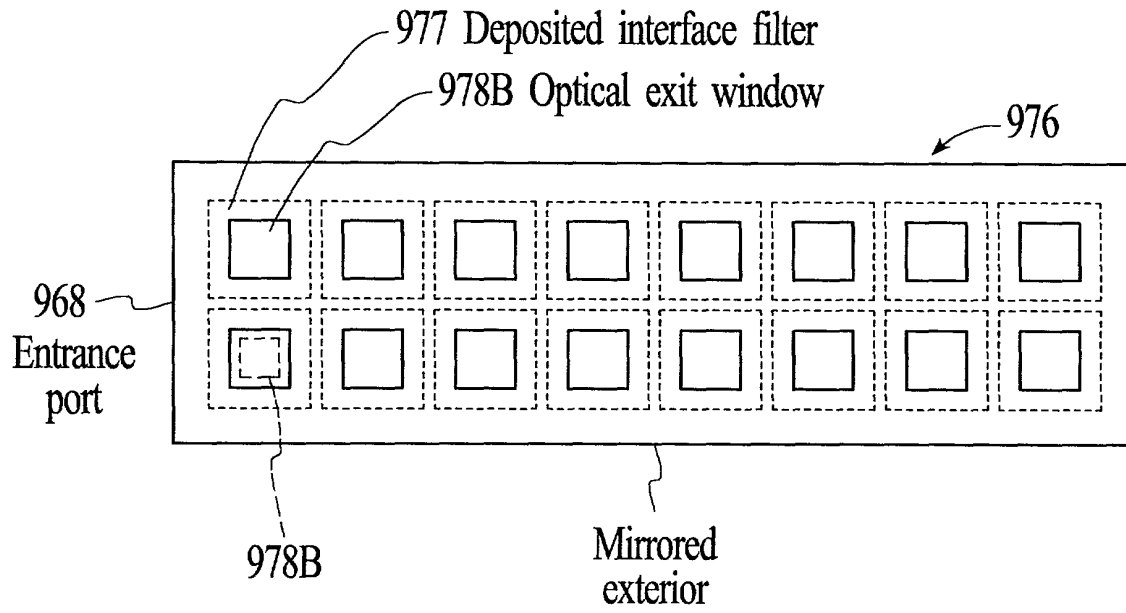


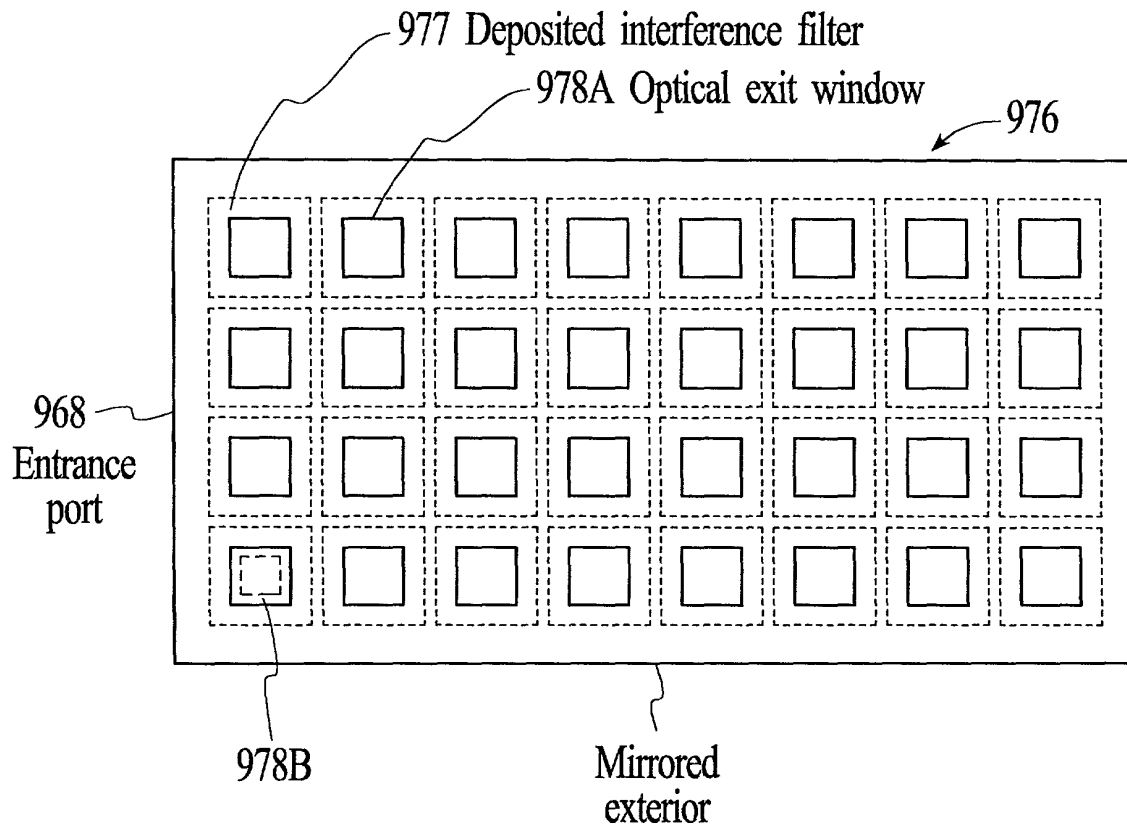
FIG. 73B

Non-Coherent Light Guide End View B



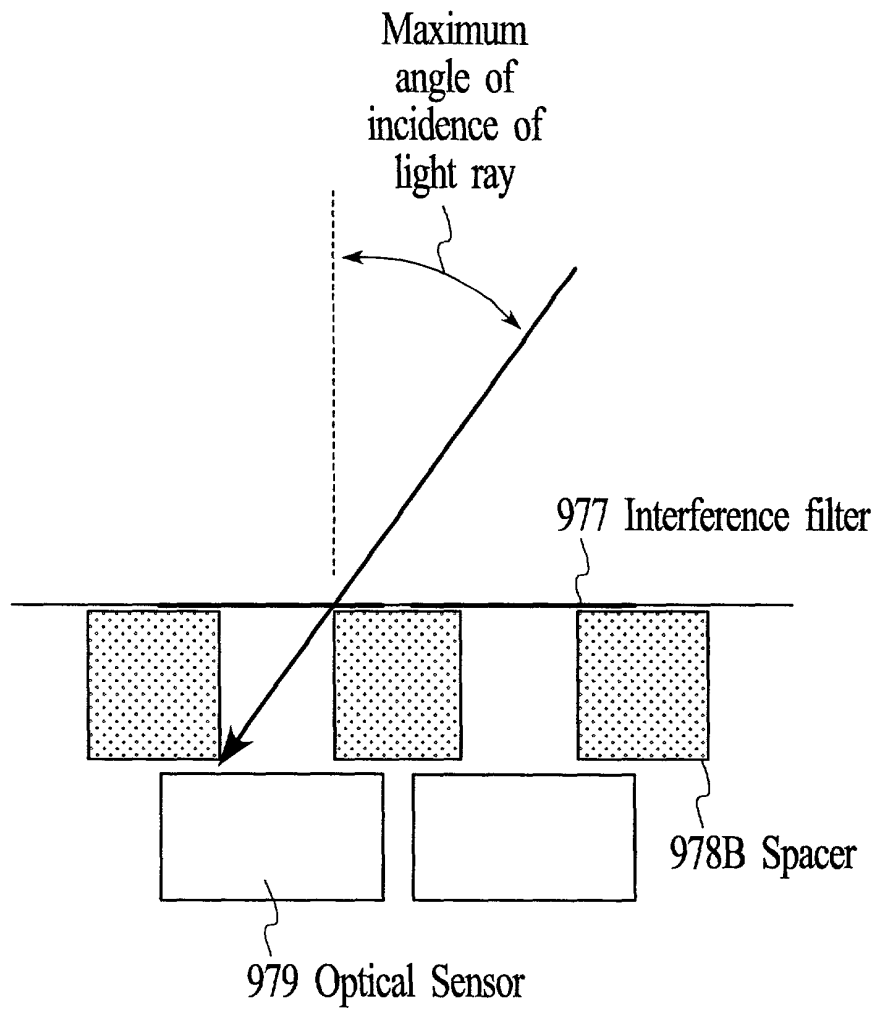
Optical Manifold

FIG. 74A



Optical Manifold A Exit Port Detail

FIG. 74B



Optical Manifold Spacer

FIG. 75

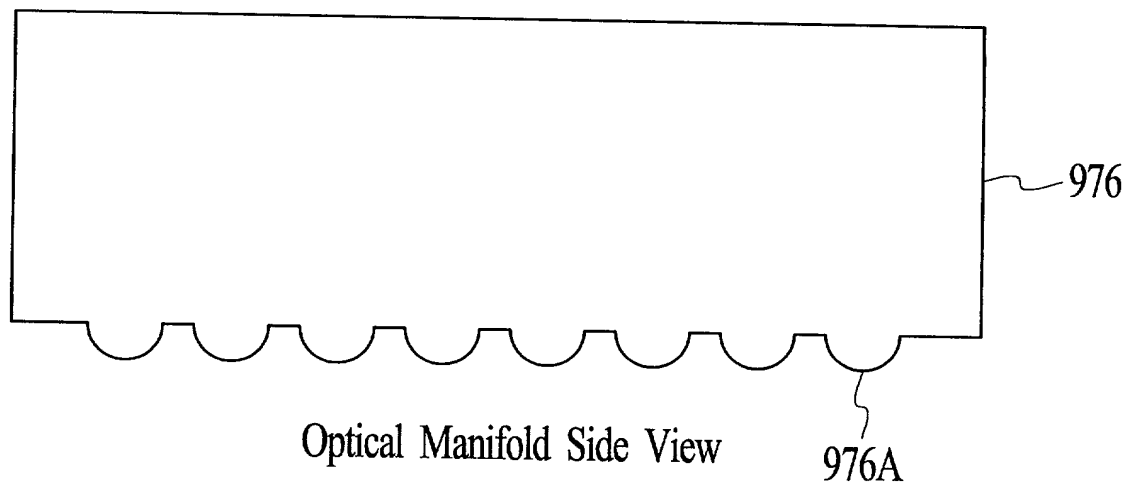
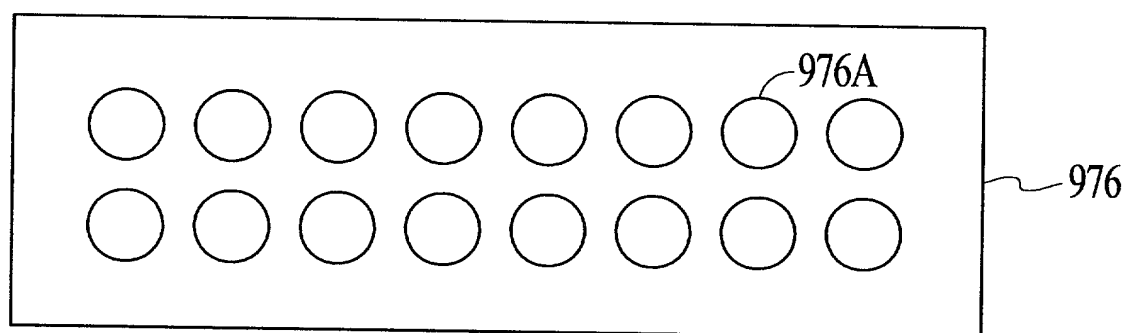
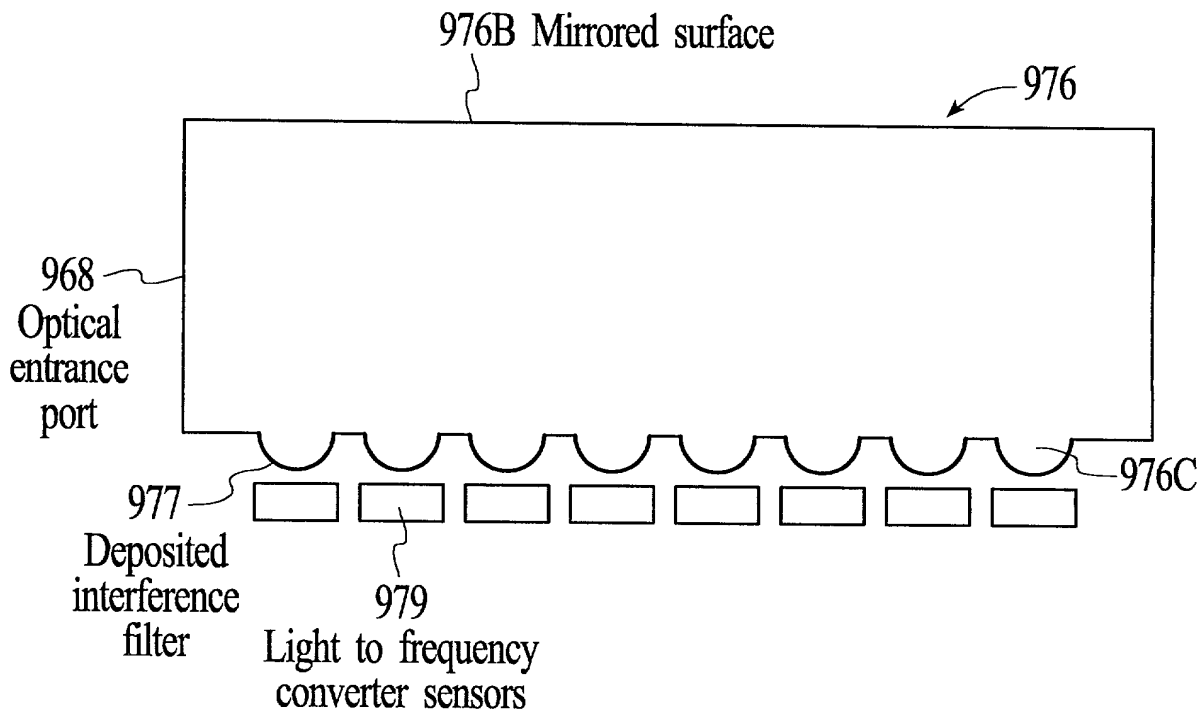


FIG. 76A



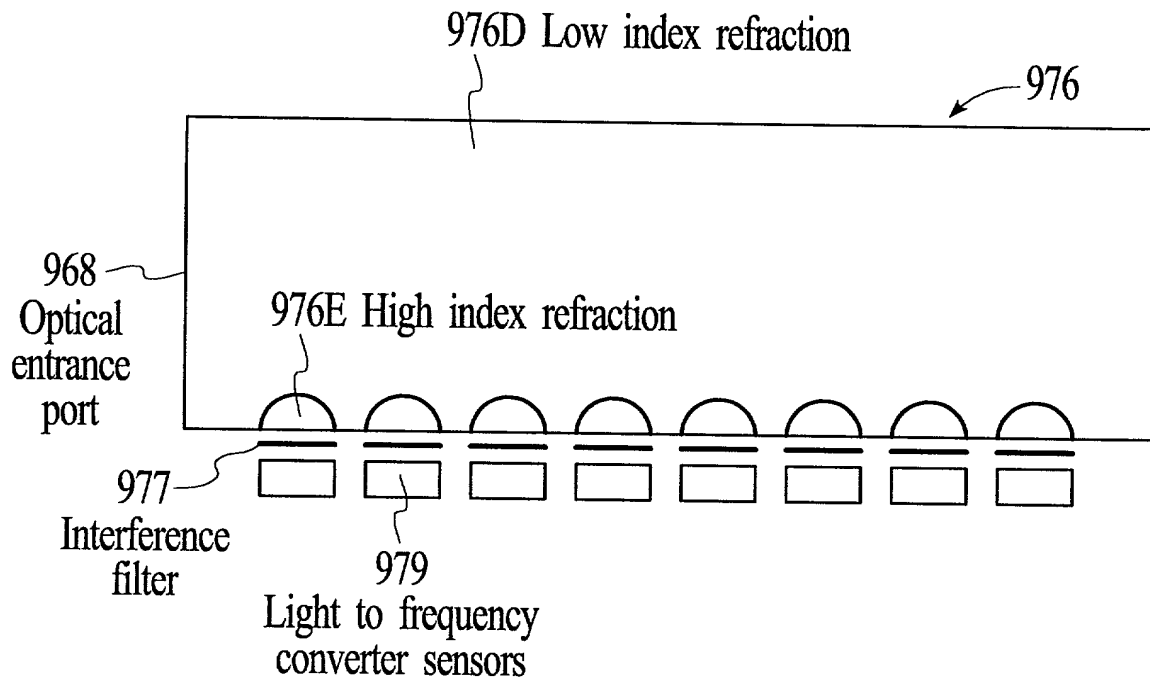
Optical Manifold Bottom View

FIG. 76B



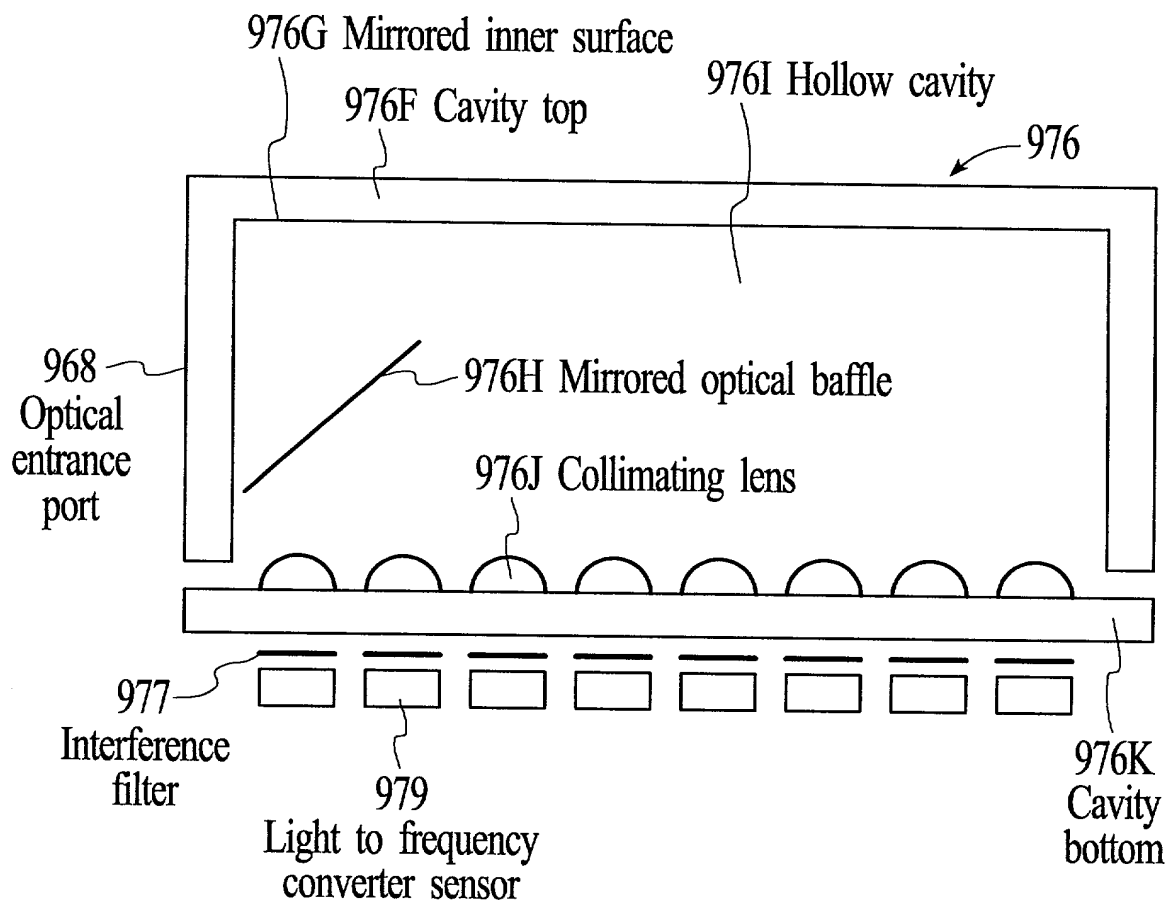
Optical Manifold with Collimation Lenses

FIG. 77



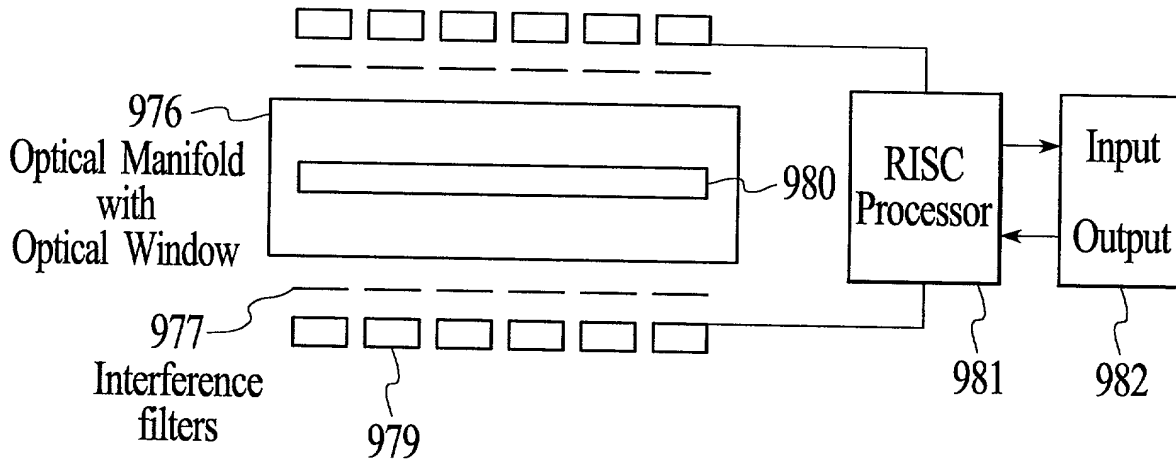
Optical Manifold with Collimation Lenses Constructed from Two Optical Materials with Different Indexes of Refraction

FIG. 78



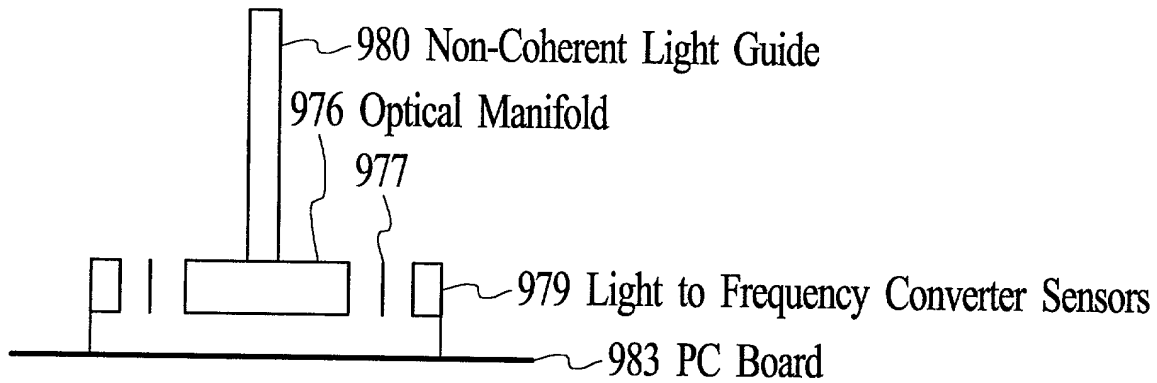
Optical Manifold with Collimating
Lenses and Hollow Cavity and Baffle

FIG. 79



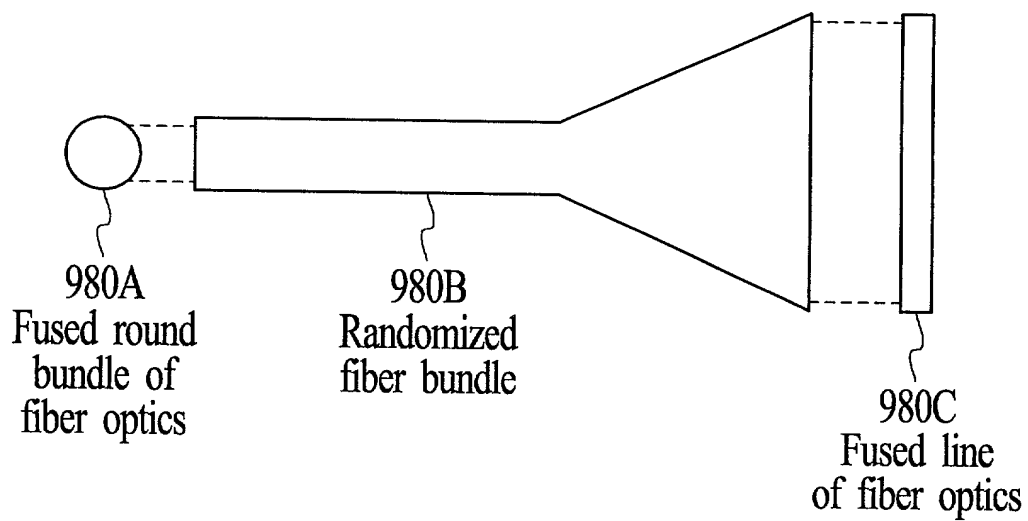
Top View

FIG. 80A



Side View

FIG. 80B



Round to Line Non-Coherent Light Guide

FIG. 81

Round to Line Non-Coherent Light Guide

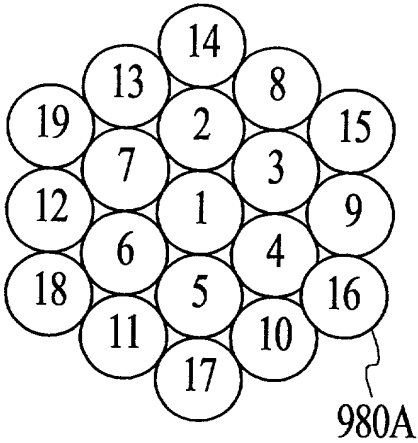


FIG. 82A

Non-Coherent Light Guide Round End

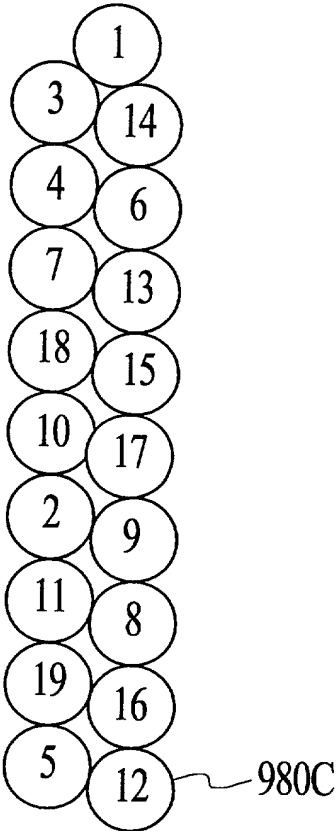
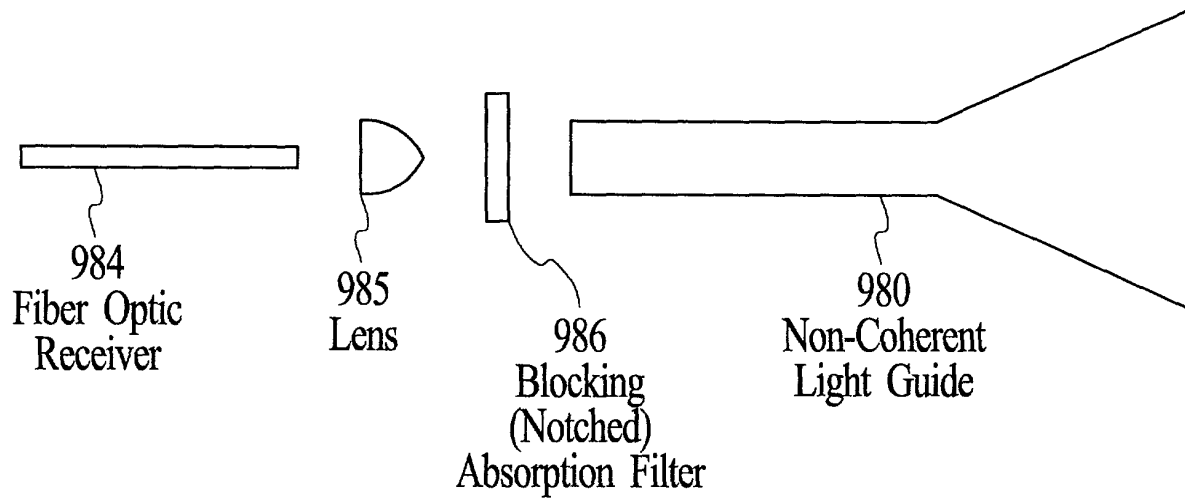


FIG. 82B

Non-Coherent Light Guide Line End



Round to Line Non-Coherent Light Guide
with Lens and Absorption Filters

FIG. 83

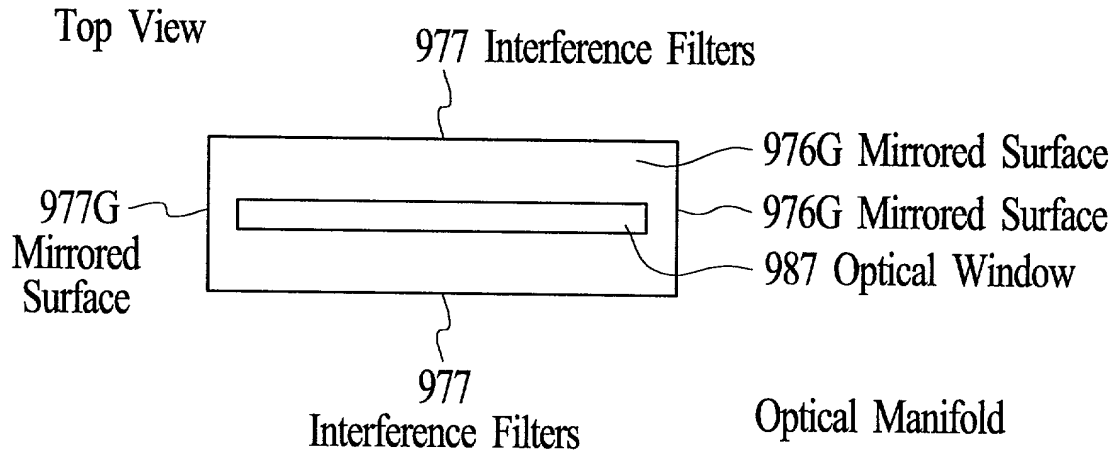


FIG. 84A

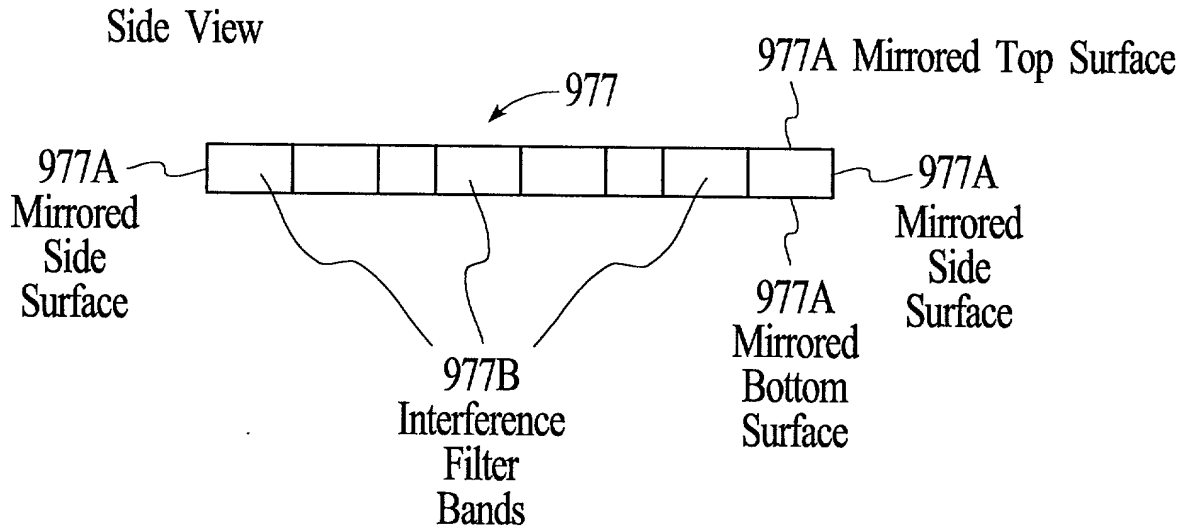


FIG. 84B

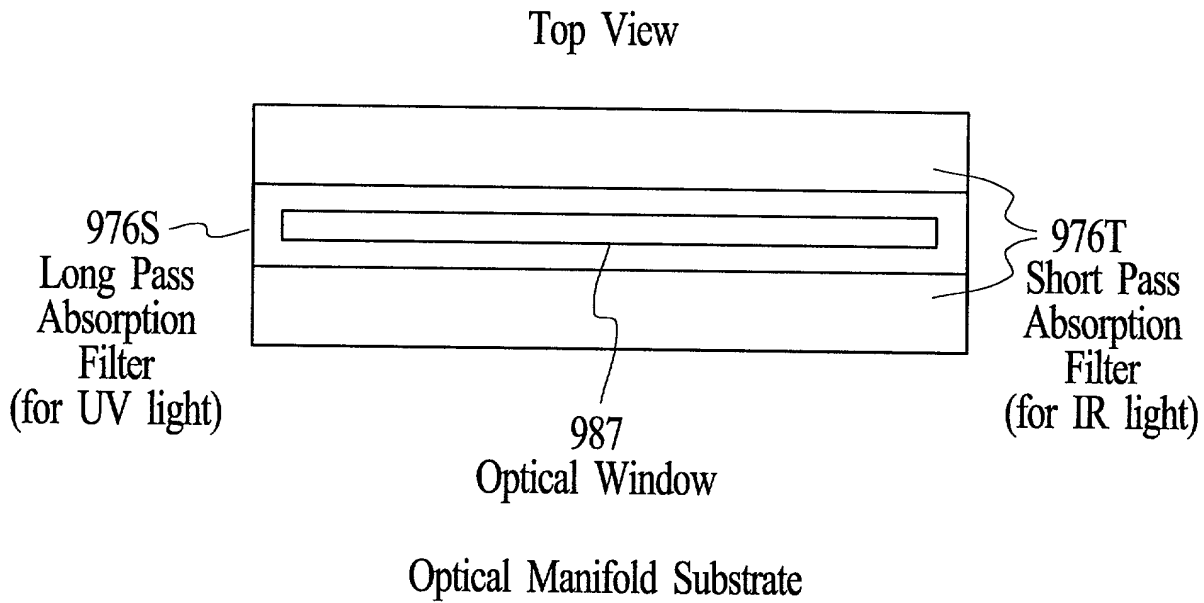


FIG. 85A

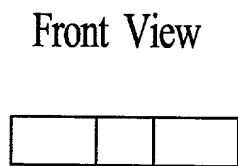
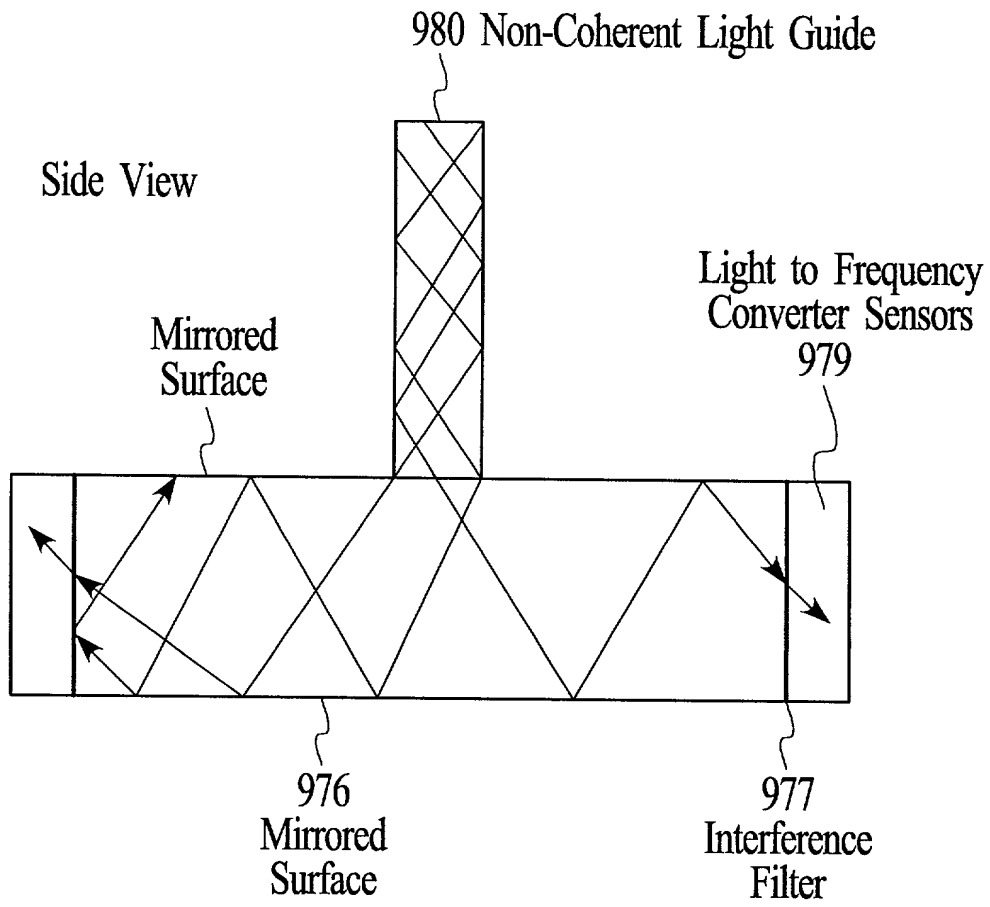
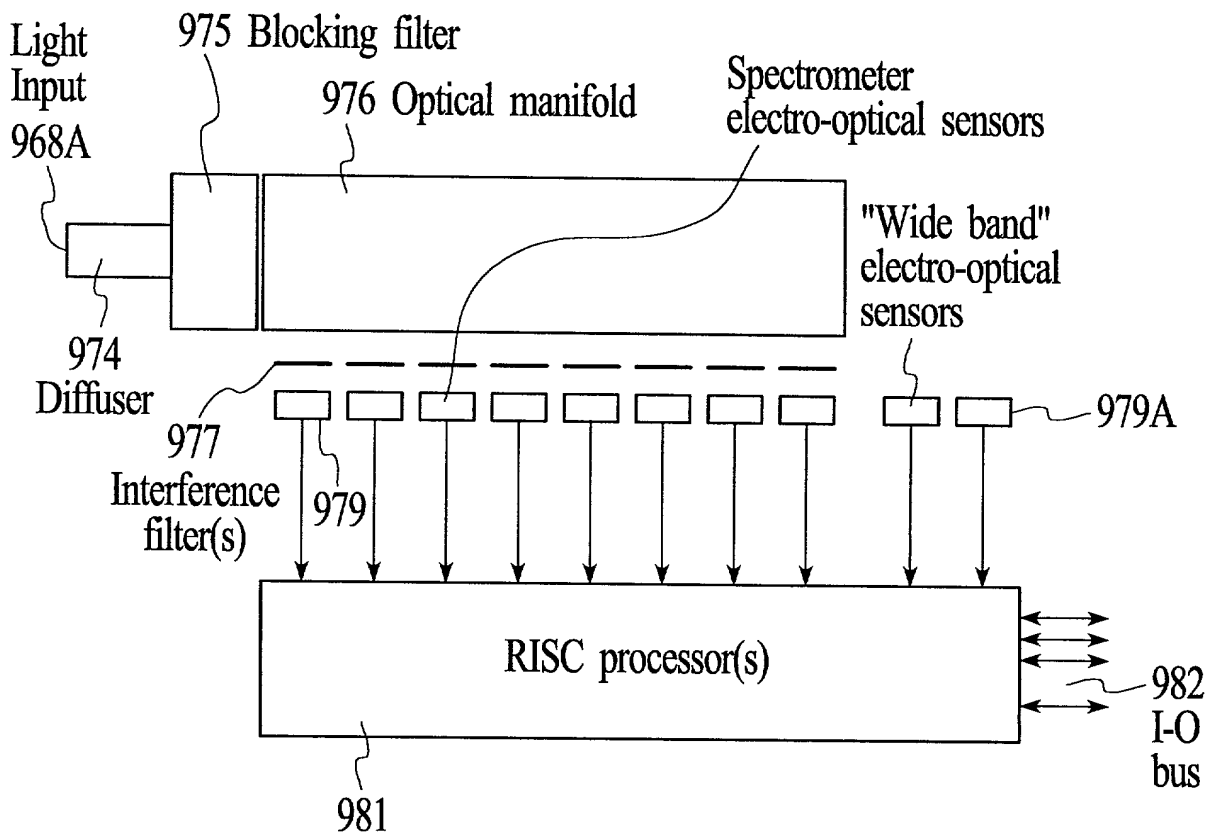


FIG. 85B



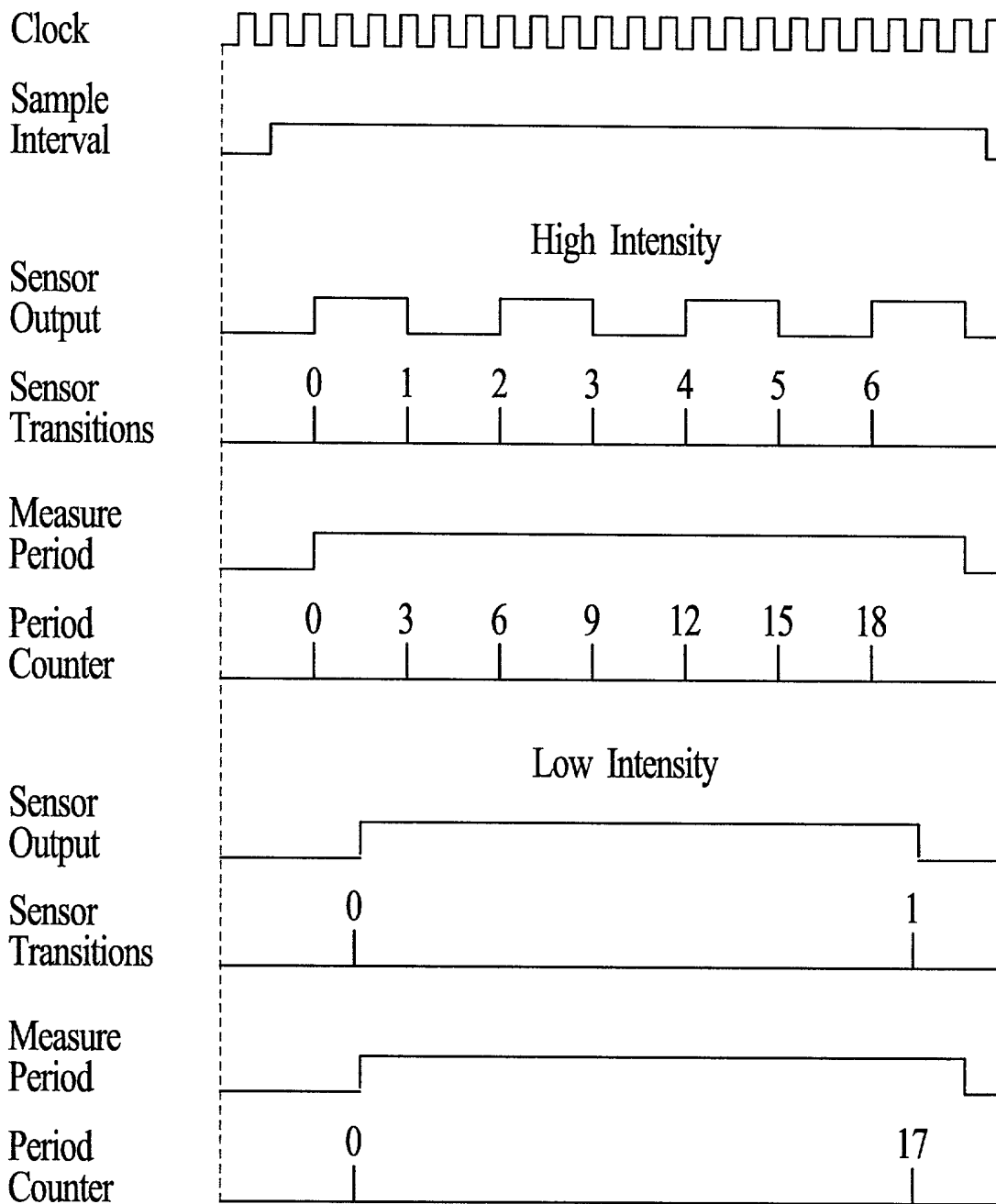
Ray Diagram

FIG. 86



Pocket Spectrometer™ Block Diagram

FIG. 87



Optical Sensors Intensity Measurement Examples

FIG. 88

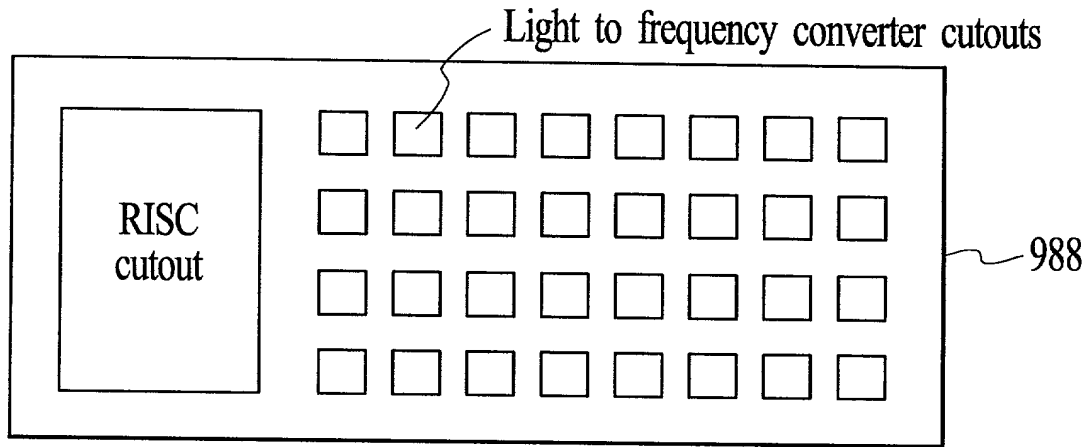
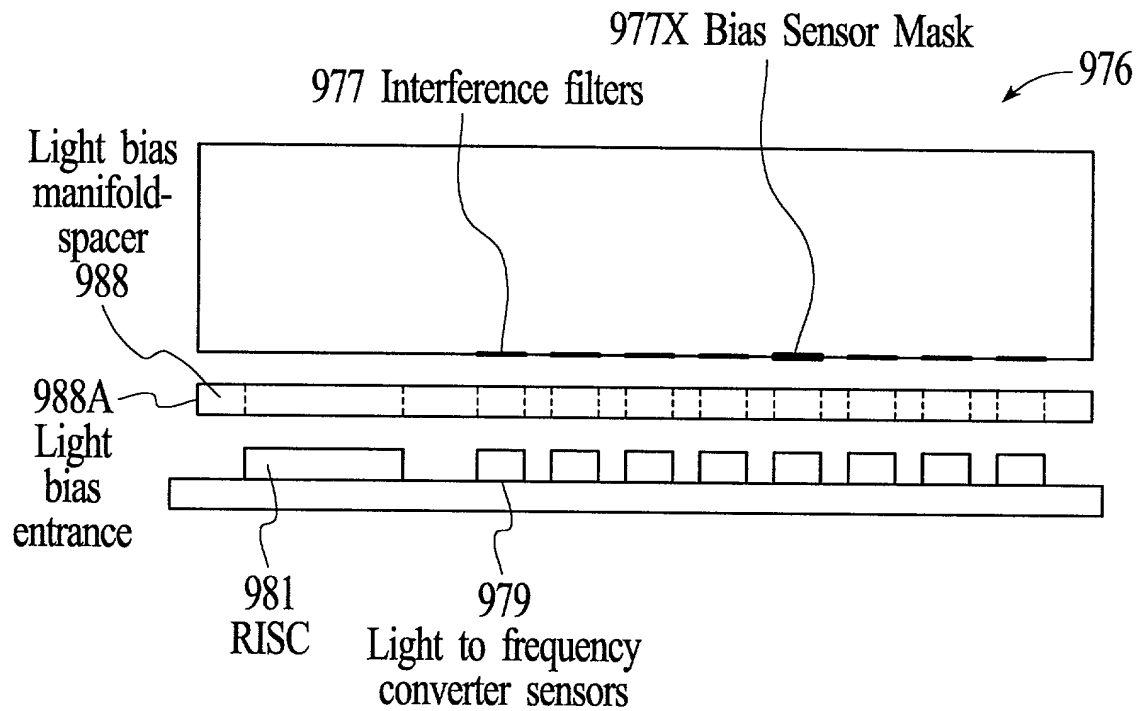
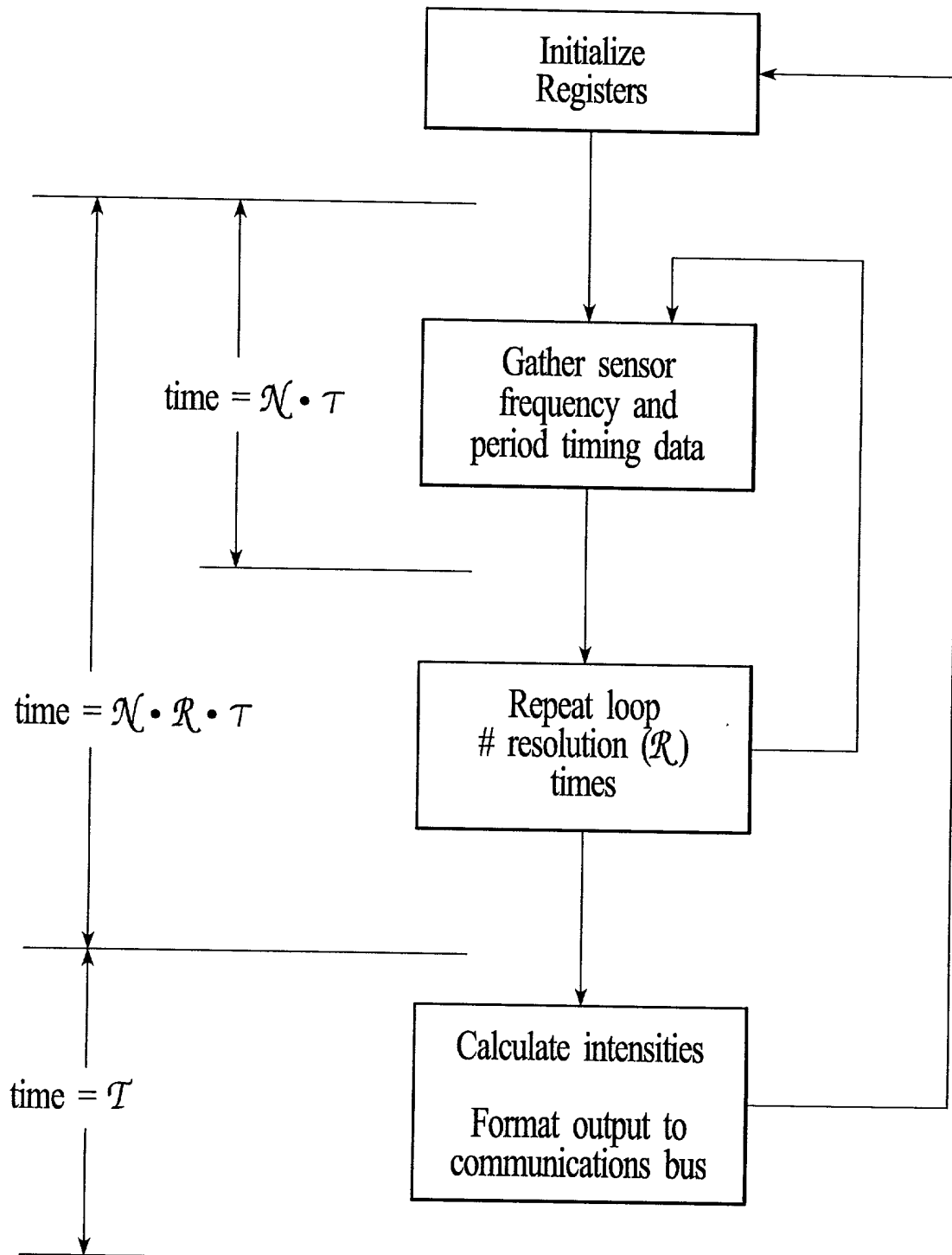


FIG. 89A



Light Bias Manifold-Spacer

FIG. 89B



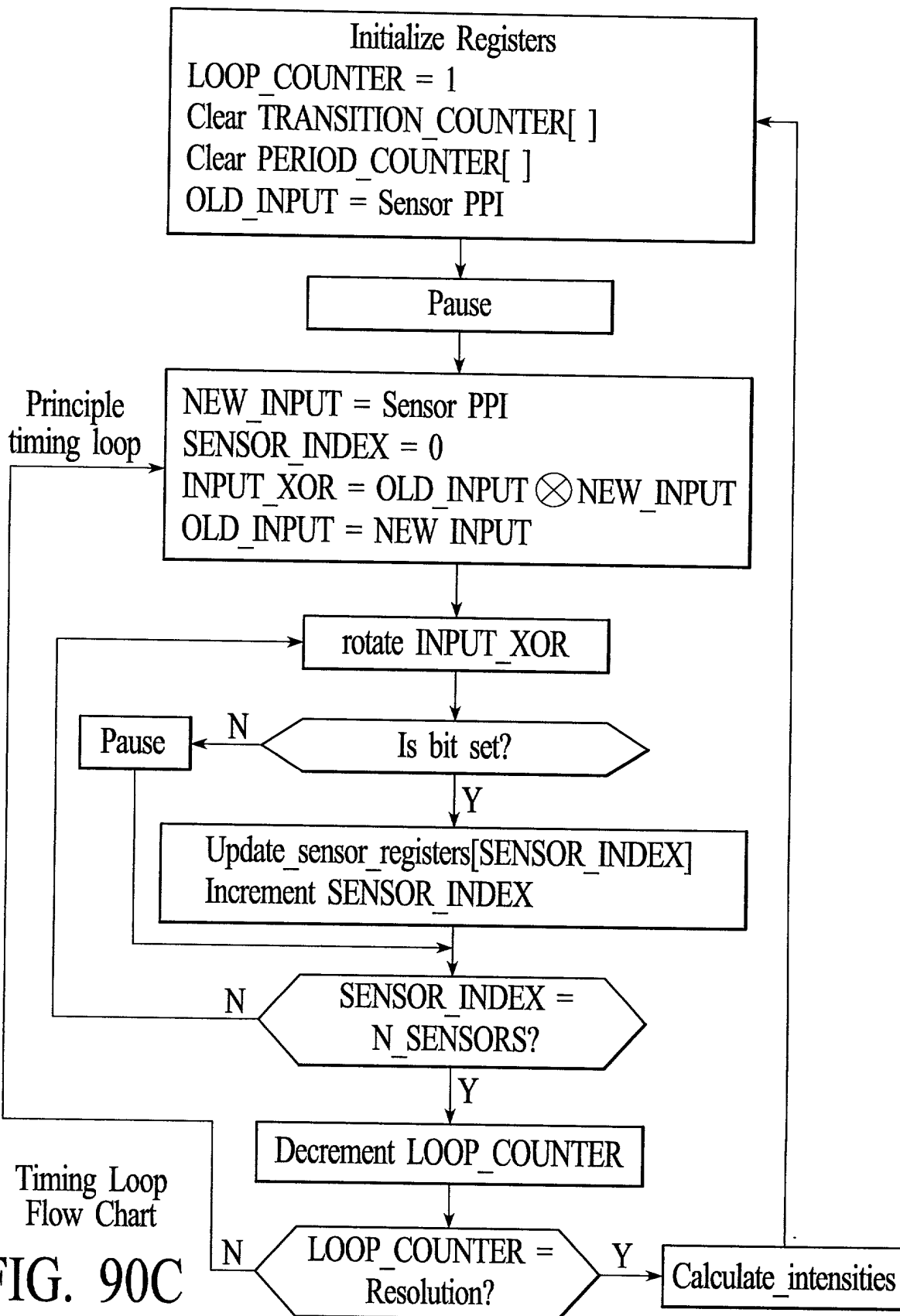
RISC Software Timing Flow Chart

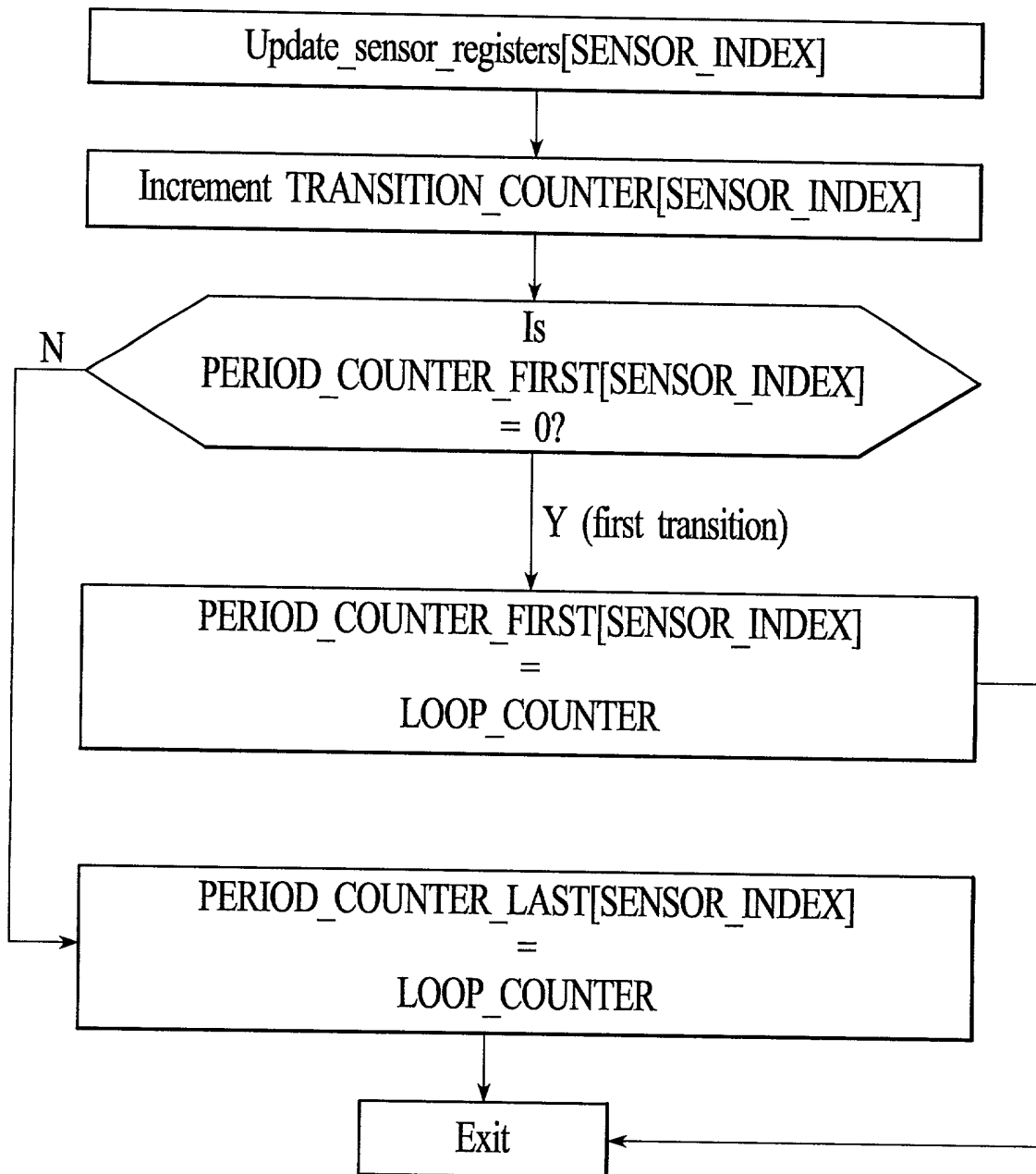
FIG. 90A

Register	Description
LOOP_COUNTER	Number of times the sensor is sampled in the timing loop. This register determines the resolution of the measurement and it also determines the sampling rate. The larger the resolution is, the lower the sampling rate.
NEW_INPUT	New sensor(s) input - each sensor input is one bit
OLD_INPUT	Former sensor input
INPUT_XOR	XOR new and old inputs
N_SENSOR	Number of sensors
SENSOR_INDEX	Index to the sensor being tested
TRANSITION_COUNTER[N_SENSOR]	Array - number of transitions that occurred for sensors
PERIOD_COUNTER_FIRST[N_SENSOR]	Array - number of timing loops executed prior to first sensor transitions
PERIOD_COUNTER_LAST[N_SENSOR]	Array - number of loops that occurred prior to final transition
INTENSITY[N_SENSOR]	Array - calculated intensity for sensor

Timing Loop Register Descriptions

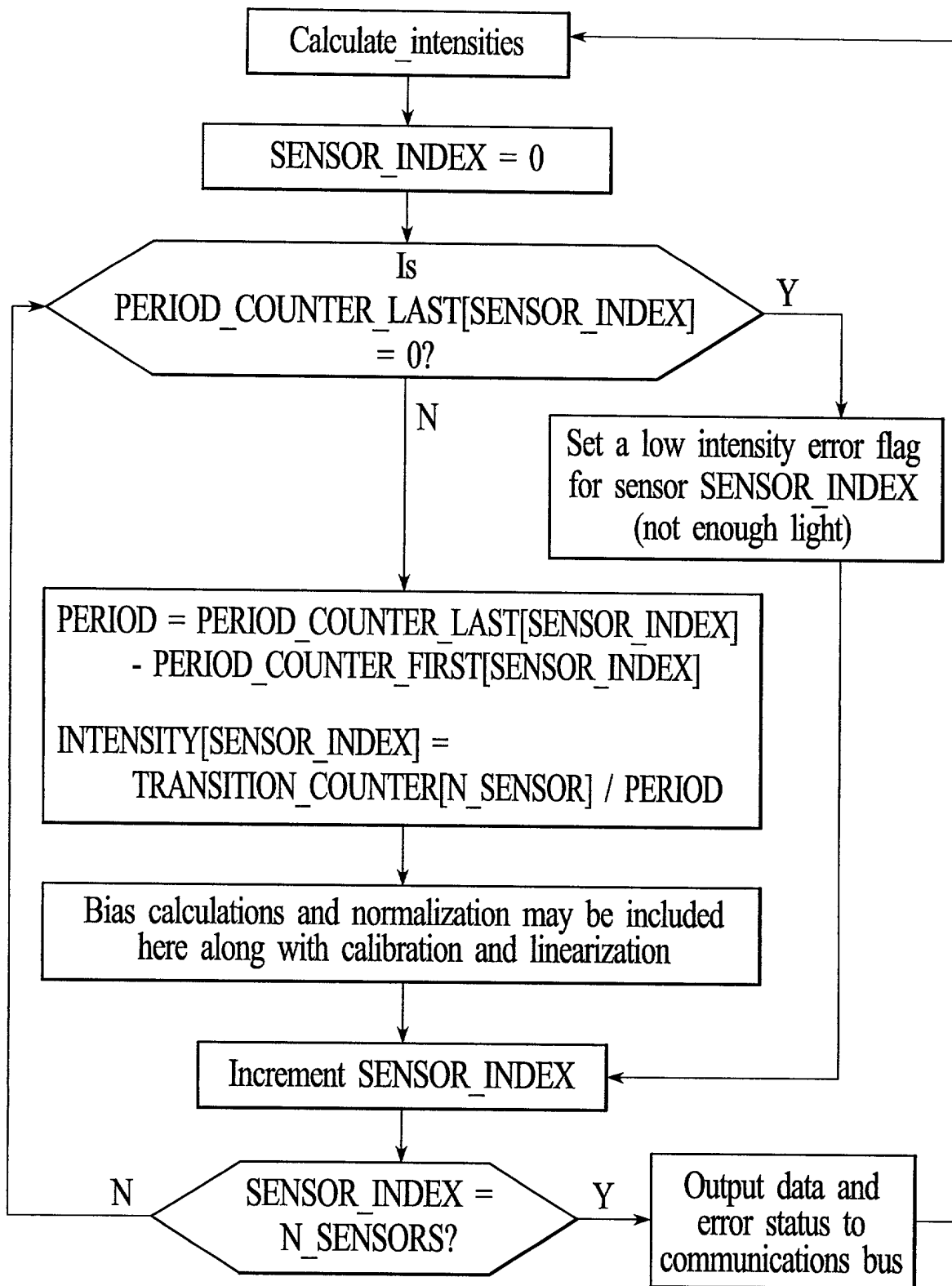
FIG. 90B





Transition Determination Flow Chart

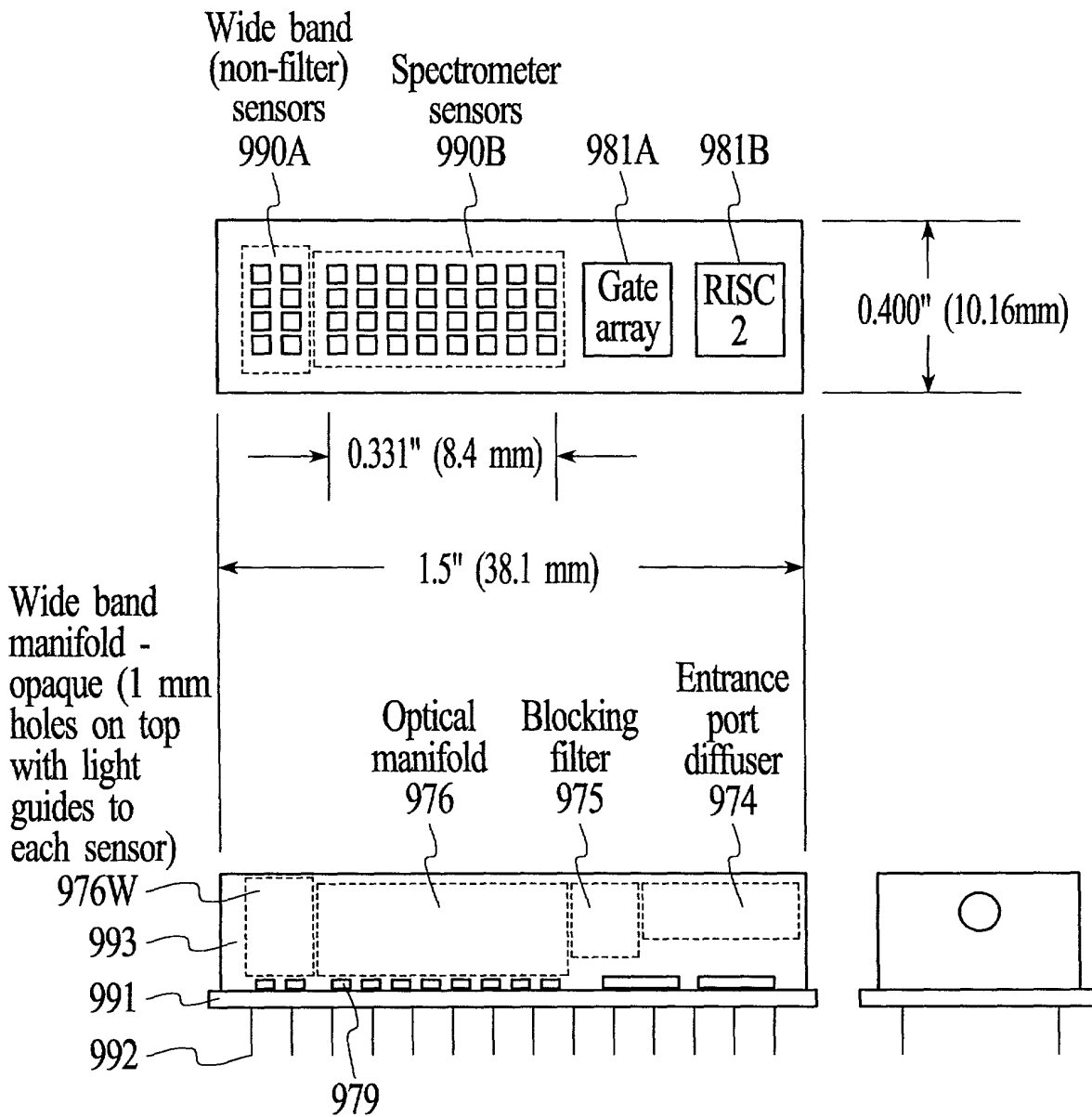
FIG. 90D



Intensity Calculations Flow Chart

FIG. 90E

204070" 50258001



Pocket Spectrometer™ Physical, 40 Sensors

FIG. 91

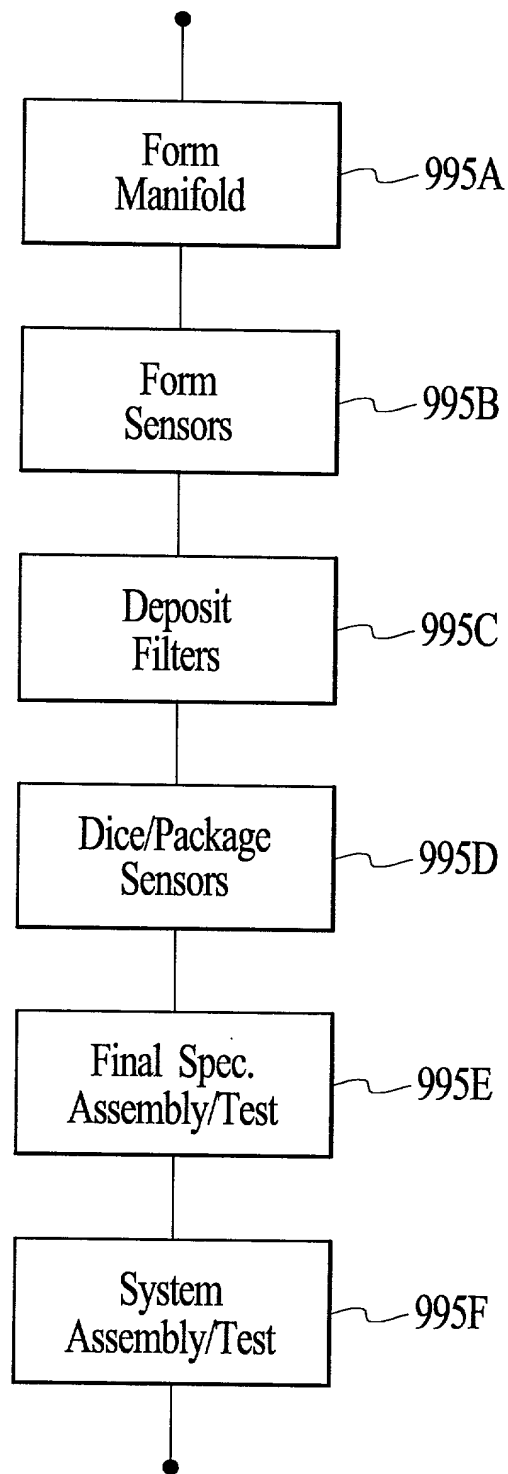


FIG. 92

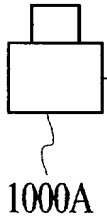


FIG. 94

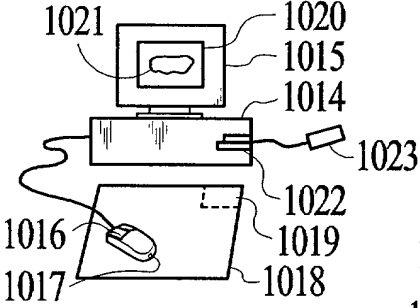
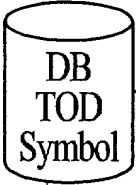


FIG. 96



FIG. 97

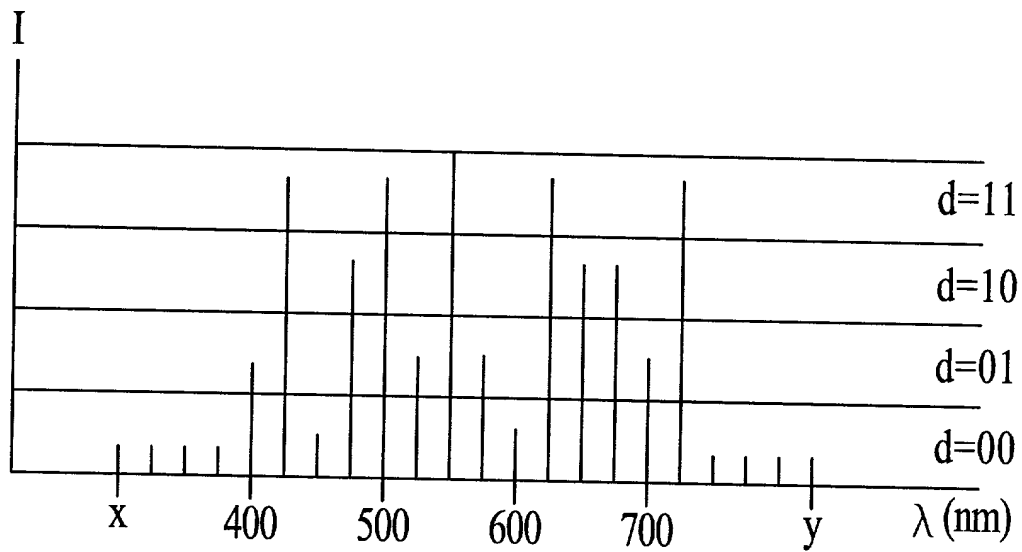


FIG. 98



FIG. 99